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EFFECT OF A TECHNOLOGY-INTEGRATED, NUTRITION EDUCATION PROGRAM ON LOW-INCOME YOUTHS' DIETARY INTAKE

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EFFECT OF A TECHNOLOGY-INTEGRATED, NUTRITION EDUCATION PROGRAM ON LOW-INCOME YOUTHS' DIETARY INTAKE

BY

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ABSTRACT

Childhood obesity is an important public health problem as it relates to several chronic diseases and continues to be high, particularly among low-socioeconomic (SES) and racial and ethnic minority populations. In 2011-2014, 25.0% of Hispanic 6-11-year-old school-aged children were considered to be obese or extremely obese, followed by 21.4% of non-Hispanic black children and 13.6% of non-Hispanic white children. When compared to higher-SES children of the same ethnicity and race, low-SES Hispanic, white, and black children were 2.7, 1.9 and 3.2 times more likely to be obese, respectively. Contributing to the obesity epidemic among children is the excess consumption of energy-dense snacks (EDS) and sugar-sweetened beverages (SSB) and not meeting the dietary recommendations for fruits and vegetables (FV). Given their wide reach, schools are an optimal location to educate on the importance of healthy foods and/or reduction of unhealthy foods that may influence dietary habits.

The majority of school-based nutrition interventions have focused primarily on increasing fruit and vegetable (FV) consumption. However, this is problematic because while EDS and SSB provide very little in terms of nutrients, they more than likely replace healthy foods and also provide a lot of calories which can lead to weight gain. Furthermore, students respond favorably to technology, a tool that has been shown to increase nutrition outcomes, yet has been sparsely used in EDS and SSB-targeted nutrition education with low-SES school-aged students. Therefore, the first chapter focuses on the primary aim of this study which was to test the effect of a 13-week school-based nutrition education program on EDS (sweet and salty) and SSB

intake with low-SES 3rd grade students utilizing the technology-integrated *Body Quest: Food of the Warrior* curriculum enhanced with additional nutrition education materials. The treatment 3rd graders significantly decreased their EDS and SSB consumption from baseline (week 1) to post-assessment (week 13). When compared to the control group over time, the treatment 3rd graders significantly decreased their EDS consumption. These results indicate that the school-based nutrition education program is effective in decreasing EDS consumption in low-SES 3rd graders.

While school-based nutrition education programs help improve what foods students consume, there is room for improvement. One way to improve these programs is by incorporating student feedback into nutrition education programs. Moreover, students' perspectives may help provide a more complete picture on how a school-based nutrition education program can impact what they eat. They may also provide insight into the students' perceptions of the program to help guide future programming. However, few studies have incorporated feedback from low-SES, racially and ethnically diverse school-aged students. Thus, the second chapter concentrates on the secondary aim which was to determine the acceptability and appeal of the school-based program, as well as barriers and/or facilitators to behavior changes by the 3rd grade students, through semi-structured focus groups. Qualitative analysis found that the 3rd grade treatment students enjoyed the program, yet had suggestions for improvement; perceived that the program influenced their attitudes towards making healthy choices and also affected what their family was consuming; and shared barriers such as appealing taste to unhealthy food that prevented them from

eating healthier. The students' insights help to inform future program content and understand what facilitates and prevents behavior change.

Lastly, as parents/caregivers play a critical role in shaping the child's environment and behaviors, they also need to be included in education efforts. However, parental involvement in nutrition education programs remains a challenge, and are often only provided indirect education through newsletters. Active involvement is successful in behavior change, yet is sparse, especially in the low-SES population. Therefore, the attention of the third chapter is of the third exploratory aim of this study. The third aim explored if students exposed to an additional group-based parental component would have greater improvement in EDS and SSB outcomes compared to those students who only receive the in school nutrition education program. As extensive recruitment and retention efforts were made for a 6-week "Family Night" program, this exploratory aim morphed into an opportunity to share "lessons learned" around recruitment, retention and family programmatic successes and challenges. Multiple modes of recruitment including flyers, stickers and text messages were used. Additionally, involving students in the program and reminder text messages encouraged repeated family attendance. From baseline (week 1) to post-assessment (week 6), parents improved in nutrition-related parental practices, children increased their confidence with cooking skills, and both parents and children improved in nutrition-related habits. While recruitment and retention was a challenge, the "Family Night" program was successful in improving the involved families' well-being.

In conclusion, this multicomponent intervention targeted at low-SES 3rd graders successfully decreased unhealthy dietary consumption, improved family nutrition-related habits, and provided a mode for students to express their thoughts, share insight, and contribute in a meaningful way to future programming.

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DEDICATION

I dedicate this dissertation to my family. This dissertation would not be possible without the love and endless support of my family. To my husband Ben, you are amazing. Your sacrifice to be here in the States, hard work day in and day out, devotion as an incredible father, and unconditional love you provide me is astonishing. Thank you for letting me add this doctoral degree to our insane and wonderful last 4 years. Cheers to many more (less hectic) years! To my parents, Joe and Gayle, thank you for always believing in me, giving me sound guidance, being great role models, and moving down the street from us! Whether it was life advice, a hot meal or watching the boys, your support means a lot to me and I appreciate all that you have done for myself, Ben, Tyler and Ryan. And speaking of Tyler and Ryan- I am so lucky to be your mom. Thank you for giving me smiles and cuddles day in and day out, for making me laugh and look on in wonder at you as you learn something new every day, and for keeping my life in perspective. Our little family is complete because of you two.

PREFACE

This dissertation is presented in Manuscript Format. This research is a part of a 5-year United States Department of Agriculture (USDA) Children, Youth and Families at Risk (CYFAR) grant awarded to the University of Rhode Island Providence Community Nutrition office. Each of three manuscripts will be submitted for publication in the journals described one each manuscript title page. It is the hope that this research adds meaningful information to the body of literature around nutrition education for children.

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CHAPTER ONE

"Technology-Integrated Nutrition Education Program Focusing on Low-Income Student's Consumption of Unhealthy Snacks and Drinks"

by

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will be submitted to *Journal of Nutrition Education and Behavior*

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Funding agency: This research was supported by the Children, Youth and Families at Risk (CYFAR) research grant awarded from the United States Department of Agriculture (USDA)

Objective: To describes the results of a technology-integrated intervention on energy-dense snacks (sweet and salty) (EDS) and sugar-sweetened beverage (SSB) consumption with low-income 3rd grade students.

Design: 2x2 quasi-experimental research study

Setting: Low-income schools in Providence, Rhode Island

Participants: 217 treatment and 242 control low-income, ethnically and racially diverse (treatment 89.6% free/reduced, 63% Hispanic, 20% Black; control 88.2% free/reduced, 62% Hispanic, 18% Black) 3rd grade students.

Main Outcome Measure(s): EDS and SSB consumption using baseline (week 1) and post-assessment (week 13) previous day self-recall.

Intervention: 13-week in school program held once per week for one-hour. The hands-on, technology-integrated program used a modified version of the *Body Quest: Food of the Warrior* curriculum.

Analysis: A combined variable for sweet and salty snacks was created (EDSAVG). Addition of the variable "EDSAVG" (sweet and snack variables combined and averaged). Pearson correlation assessed relationship between variables. Paired t-tests and multiple analysis of variance determined within and between group changes over time, respectively. Statistical significance was set at $p<0.05$.

Results: Treatment students significantly decreased their consumption of EDSAVG, along with sweet and salty snacks separately, as well as SSB from baseline to post-assessment. There was a between group difference over time for EDSAVG and SSB, although EDSAVG was only significant between groups.

Conclusions and Implications: A technology-integrated, school-based nutrition education program is effective in improving EDS consumption in low-SES 3rd graders. Long term implications may be continued healthy habits and healthy weight.

MeSH terms: health education, child, sugar-sweetened beverages, snacks, school-based

INTRODUCTION

Given that childhood obesity is associated with many chronic diseases, prevention efforts are critical, especially among racial and ethnic minority populations.[1] In 2011-2014, 25.0% of Hispanic 6-11 year old school-aged children were considered to be obese or extremely obese, followed by 21.4% of non-Hispanic Black children and 13.6% of non-Hispanic White children.[2] Independent of ethnicity, lower socio-economic status (SES) is also associated with higher obesity prevalence. When compared to higher SES children of the same ethnicity and race, low-SES Hispanic, White, and Black children were 2.7, 1.9 and 3.2 times more likely to be obese, respectively.[3] There is a need to address obesity-related behaviors among ethnic minority school-aged children as they have a greater propensity to live in poverty.[4]

There are several potential factors to why low-SES and ethnic minority children are at higher risk of being overweight or obese including access to and consumption of low quality foods. In order to stretch the food dollar, low-cost meats, inexpensive grains, and nutrient-poor items that are low in cost are purchased.[5] As part of these low-cost food items, families purchase energy-dense snacks (EDS) and sugar-sweetened beverages (SSB), laden with fat, salt, and sugar, which are associated with excess weight.[6-10] Today's children are not meeting the dietary recommendations and are over consuming EDS and SSB.[11-14] According to 2007-2010 National Health and Nutrition Examination Survey data, on average EDS and SSB consumption makes

up 37.8% of total calories of the 6-11 year old children.[12] This is especially true for lower SES, ethnic minority children as EDS and SSB consumption have been inversely associated with parental SES[15] and have increased in non-Hispanic Black children.[16] Given that low-SES ethnic minority children are more likely to consume an excess of EDS and SSB, there is a need for successful nutrition education interventions that target these behaviors.

The majority of school-based nutrition interventions have focused primarily on increasing fruit and vegetable (FV) consumption.[17, 18] These interventions have focused on low-SES minority populations, and found success with improved FV consumption, knowledge, attitudes and/or beliefs.[19-25] Of school-based interventions involving low-SES minority children, few have focused on decreasing unhealthy habits such as EDS and SSB consumption.[22, 26-28] Not only do EDS and SSB provide very nutritional value at a high calorie cost, which can lead to weight gain, they replace healthy foods.[29, 30] Furthermore, children respond favorably to technology, a tool that has been shown to increase nutrition outcomes,[31, 32] yet has been sparsely used in EDS and SSB-targeted nutrition education with low-SES school-aged children.[22, 27, 28] Of the studies that have targeted unhealthy dietary behaviors through technology, Sharma et al pilot tested the *Quest to Lava Mountain* computer game with middle- to low-SES children (n=107), and found a significant decrease in sugar consumption in the treatment group when compared to the control group (β= -9.73; 95% CI= -18.00, -1.47, p=0.021).[22] However, there was no indication of which sugar-containing foods or drinks decreased. The University of Alabama's school-based nutrition education curriculum *Body Quest: Food of the Warrior* (BQ) utilized

technology with low-SES elementary-aged children to impact changes in FV consumption[24] and intention to change SSB consumption.[28] However, it has not assessed actual changes in EDS and SSB consumption. There is a need to improve EDS and SSB consumption among school-aged ethnic minority children through school based nutrition education approaches. This research article describes the results of a quasi-experimental, technology-integrated intervention on EDS (sweet and salty snacks) and SSB consumption with low-income 3rd grade students. The school-based nutrition education curriculum used in the intervention is based on the Social Cognitive and Experiential Learning theories and utilized a modified version of the technology-integrated BQ curriculum.[24] The objectives of the research study were to determine the effect of the technology-integrated 13-week nutrition education program on low-SES 3rd graders' consumption of EDS and SSB. It was hypothesized that the intervention students would decrease EDS and/or SSB consumption due to the program compared to the control students.

METHODS

Study Design

This 2x2 quasi-experimental research study was one component of a clustered-controlled trial conducted through a 5-year United States Department of Agriculture (USDA) Children, Youth and Families at Risk (CYFAR) grant awarded to The University of Rhode Island's (URI) Providence Community Nutrition office. Over a

three-year period, three intervention schools (10 3rd grade classrooms) and three control schools (11 3rd grade classrooms) participated in the study. Both groups completed data collection at two time points during the school year. The design of one treatment and one control school each year was chosen to help increase reach and sustainability of the program. That treatment school sustained the program in the next year by the 3rd grade teachers implementing the education; meanwhile the researchers implemented the program with a new treatment group. The University of Rhode Island's ethics committee granted internal review board approval for this research study (IRB#HU1415-015).

Participants and Recruitment

Providence, Rhode Island is one of the four core cities in the state, with an average 87.7% of public school students eligible for free or reduced-school meals.[33] The city population consists of 64% Hispanic and 17% Black/African-Americans.[34] Based on Principal and 3rd grade teachers consent, the school district determined the initial treatment and control schools; in the next school year, the previous control school became the treatment school and stakeholder referrals were used to select the subsequent schools. Figure 1 provides details of number of classrooms and student participants. Parents and caregivers received a letter via their student's backpack describing the study and 3rd grade students in participating classrooms engaged in the program as a part of their science curriculum as approved by the URI IRB #1213-106.

Instruments, Protocol and Data Collection

Cognitive interviews were held with six 3rd grade students to ensure survey instrument clarity and understanding. Students did not understand the terms "Hispanic" or "non-Hispanic", but instead understood when interviewer asked if they spoke Spanish at home. Based on this information, ethnicity was defined as the student speaking Spanish at home. Additionally, "other" and "not sure" categories were added as options to the race question, as some students did not identify with any option provided or were unsure. No changes to the nutrition-related behavior questions on sweet snacks, salty snacks, SSB, fruits and vegetables were made. To ensure uniformity, a standard script to administer the survey was provided to data collectors.

Each student was assigned a unique identification number. Educators collected demographic information including age, gender, race and ethnicity as well as nutrition-related behaviors through Surveymonkey.com in both Spanish and English on iPads. The survey included instruments provided by USDA CYFAR and those adapted from the Beverage and Snack Questionnaire.[35] Through self-recall, nutrition-related behavior questions assessed the following: "how many times did you eat a sweet snack yesterday between your meals?" (and same for salty snacks), "how many times did you drink a sugary drink yesterday? Do not include 100% fruit juice, chocolate milk or diet drinks.", as well as how many times in the previous day fruits and vegetables were consumed. Each question provided picture examples of the food or drink in question to help make clear what constituted a sweet snack, salty snack and SSB and help spur recall from the previous day's consumption. Picture examples of

sweet snacks included cookies, sugary cereal, chocolate candy, non-chocolate candy, a cupcake, a toaster pastry, and a donut. Picture examples of salty snacks included chips, pretzels, French fries, party mix and crackers. Picture examples of SSB included soda, sports drinks, energy drinks, sweetened iced tea, and fruit drinks. All questions were multiple choice, with range option of "0 times" to "5 or more times" consumed.

Data were collected at two time points (always a week day) for both groups: baseline (week 1) and post-assessment (13 weeks) with the control data collected within a 2-week period of treatment data. To complete all surveys, the students followed along as the educator read each question aloud to the class, allowing for visual and auditory understanding of the question. Set examples to clarify questions were provided with questions. The surveys took approximately 20 minutes to complete. If any student was absent, a rescheduled survey time was attempted to be made as close to the original date as possible. Process evaluation conducted throughout the intervention included weekly attendance of each student.

Intervention

The intervention school received a weekly one-hour in-class program for 13-weeks while the control school received no programming. The curriculum involved interactive, hands-on activities as well as seven iPad applications created for the BQ curriculum to reinforce topics taught by the educators who were Registered Dietitians. A modified version of the BQ curriculum was used. Modifications included extending

all 13 lessons from 30 minutes to one hour in length. This allowed each topic to be more robust with additional hands-on activities. It also allowed for additional topics not covered in the original curriculum to be taught. Such additional topics included breakfast, "Go, Slow, Whoa", MyPlate, fast food, and sugar-sweetened beverages. Lastly, the modified curriculum removed the FV tasting portion of the original curriculum and instead relied on the USDA Fresh Fruit and Vegetable Program which provided a fruit or vegetable in the classroom during the lesson. This modified curriculum was piloted with one 3rd grade classroom. No major modifications were made after the pilot. Table 1 provides details of curriculum topics.

Statistical Analysis

G*Power version 3.0.10 was used to calculate sample size. Sample size calculations were performed based on expected changes in EDS and SSB from pilot year data.[36] In the pilot, the treatment group (n=70) had a significant decrease in EDS consumption between meals by 0.70±1.41 times per day and a significant decrease in SSB consumption by a mean of 0.94±1.85 times per day; the control group (n=59) had a significant decrease in EDS by 0.42±1.40 times per day and no change in SSB consumption (0.00±1.77 times per day)[36]. A required sample size of 768 and 118 3rd graders were necessary to determine the effect of the intervention on EDS and SSB, respectively, with an alpha set at 0.025 and statistical power at the 0.80 level.

All statistical analysis for this project used IBM SPSS software (version 24.0, IBM SPSS Statistics, Armonk, NY, 2016). Numerical (skewness and kurtosis) and

graphical (histogram) methods were used to determine normalcy. Baseline Pearson Correlation between variables was run for both treatment and control groups. One additional variable was created from survey questions: "EDSAVG" (sweet and snack variables combined and averaged, Cronbach alpha 0.72).

Independent t-tests and chi squared assessed any differences between the treatment and control group at baseline for continuous and categorical variables, respectively. Paired t-tests were used to assess within group differences and analysis of variance (ANOVA) for between group differences of EDSAVG, sweet snacks, salty snacks, and SSB. To account for the study design in which some, but not all schools involved, were both treatment and control groups, paired t-tests were ran for EDSAVG, sweet and salty snacks separately, and SSB for each treatment and control group involved in each year of data collection. Significance was set at $p < 0.05$.

RESULTS

Descriptive characteristics

Two-hundred and seventeen (217) treatment and 242 control students completed baseline data. Overall, both groups had a high eligibility for free/reduced-meals, were on average approximately eight years old, and roughly equally split in gender distribution. There were no significant difference in baseline demographic

characteristics between the two groups (Table 2). Of note is the low attrition rate throughout the research study, with only a 10.1% and 11.2% loss for the treatment and control groups, respectively (Figure 1). Most attrition was due to relocation of students to another school or absenteeism on data collection days, despite repeated efforts to survey all students. On average, treatment students attended 11.65 lessons, with 88.1% of students attending ≥ 75% of the lessons (10 or more lessons) and 42.7% having perfect attendance.

Within and Between Group Changes

Overall, consumption of EDS and SSB was high in both the treatment and control groups (Table 2). At baseline, 88.0% of the treatment students and 88.4% of the control students consumed at least one sweet or salty snack (using EDSAVG) in between their meals during the previous day. SSB were slightly less consumed at baseline, with 75.6% and 79.6% of treatment and control students, respectively, consuming at least one SSB in the previous day. As expected, there was a moderate positive correlation between EDSAVG and SSB consumption in both the treatment ($r= 0.50$, $p<0.01$) and control groups ($r= 0.52$, $p<0.01$). Sweet snack consumption had a smaller correlation (treatment $r=0.41$, $p<0.01$; control $r=0.41$, $p<0.01$) to SSB consumption than salty snack consumption (treatment $r=0.45$, $p<0.01$; control $r=0.512$, $p<0.01$) to SSB consumption.

Paired t-tests revealed a significant decrease in EDSAVG consumed by the treatment group from baseline to post-assessment of M=0.55 times between meals in

previous day, 95% CI [0.34, 0.76], t(194)=5.10, p<0.000, d=0.37 (Table 3). When analyzed separately, both sweet snacks and salty snacks significantly decreased in the treatment group from baseline to post-assessment (Table 3). There was also a significant decrease in SSB consumption in the treatment group from baseline to post assessment of M=0.41 times in previous day, 95% CI [0.15, 0.66], t(194)=3.14, p=0.002, d=0.23.

Multiple analysis of variance (MANOVA) showed statistically significant between group differences on combined dependent variables, EDSAVG and SSB, F(2, 398)=3.63, p=0.027; Wilks' Λ=0.98; partial η^2=0.02. Follow-up univariate ANOVA showed there was a statistical significant difference in EDSAVG between the students in the two groups, F(1, 399)=6.83, p=0.009; partial η^2=0.02. When each component of the EDSAVG variable was assessed with an ANOVA, there were between group differences for both sweet and salty snacks (Table 4). However, partial eta squared showed a small effect size and power was not met at 0.80.

Additional Analysis

Over the three-year data collection period, two schools served as both control and treatment groups (schools B and C), one school as only a control group (school D), and one school as only a treatment group (school A) (Figure 2). No 3rd graders served as both control and treatment participants. For the schools that served as both control and treatment groups, paired t-tests revealed that school B had significant improvements in EDSAVG as both a control (M=0.42 times between meals in

previous day, 95% CI [0.05, 0.78, t(58)=2.27, p=0.027, d=0.30) and a treatment group (M=0.47 times between meals in previous day, 95% CI [0.07, 0.87, t(62)=2.36, p=0.022, d=0.30), and significance in salty snacks as a treatment group (M=0.56 times between meals in previous day, 95% CI [0.04, 1.07, t(62)=2.16, p=0.034, d=0.27). School C had no significant improvements as a control group, but had significant improvements in EDS (M=0.47 times between meals in previous day, 95% CI [0.07, 0.87, t(61)=2.36, p=0.022, d=0.30), salty snacks (M=0.50 times between meals in previous day, 95% CI [0.02, 0.98, t(61)=2.07, p=0.043, d=0.26), and SSB (M=0.50 times in previous day, 95% CI [0.06, 0.94, t(61)=2.27, p=0.027, d=0.29) as a treatment group.

Paired t-tests also revealed significant improvements in EDSAVG and salty snacks for all three treatment group schools, in sweet snacks for one of three treatment group schools, and in SSB for two of three treatment group schools. In the control group, the only significant improvement was with EDSAVG in one of three control group schools.

DISCUSSION

Eating behaviors of school-aged students are important for their current and future health. This is especially true for the low-SES and racially and ethnically diverse population who have a high prevalence of unhealthy behaviors as well as obesity.[13, 15, 16] Given that most technology-integrated, school-based nutrition

education programs have focused on improving FV,[19, 20, 24, 25, 37, 38] there was a need to explore the effect of such programs on decreasing school-aged student's EDS and SSB consumption. Results from this study indicate that after completing the program there was a decrease in low-SES 3rd graders' EDS (both sweet and salty). To the author's knowledge, this is the first research study to evaluate low-SES school-aged student's EDS and SSB consumption from a technology-integrated nutrition education program. Decreasing unhealthy dietary behaviors among school-aged students through such a program may be an effective way to decrease long-term health consequences associated with such behaviors like EDS consumption.

While U. of Alabama's *Body Quest: Food of the Warrior* curriculum showed positive effects on FV consumption[24] and intended change in SSB consumption[28] in low-SES students, it had not explored the effect on EDS and SSB consumption. Modifications were made to the curriculum to expand on healthy and unhealthy choices in meals and snacks as well as integrate different interactive, hands-on activities on topics. Exploration of this effect and modifications to the curriculum were warranted as nationally 6-11 year olds overconsume unhealthy foods and drinks. Based on 1999-2010 NHANES data, 73.9%, 59.4% and 76.7% of 6-11 year olds consumed sweet snacks, salty snacks, and SSB on a typical day, respectively.[39] The students involved in this research had very similar, but slightly higher than the national averages for sweet snack, salty snack and SSB consumption at baseline. Thus this cohort of students was in need of healthy behavior changes.

Often one unhealthy eating behavior is associated with another.[40] Based on baseline data of correlation coefficients and coefficient of determinations, EDS and

SSB consumption were only moderately associated with each other in both the treatment and control group, with about one-quarter of EDS consumption related to SSB consumption. When divided into sweet and salty snacks, sweet snack consumption accounted for 17% of SSB consumption in both treatment and control groups and salty snack consumption accounted for 20% and 27% of SSB consumption in the treatment and control groups, respectively. These relationships are much lower than what is nationally reported. Through 24-hour recall NHANES 1999-2010 data, Bleich and Wolfson found that 74.6% of students ages 6-11 years old (n=6,266) who consumed SSB also consumed sweet snacks and 61.4% of students who consumed SSB also consumed salty snacks.[39] This discrepancy between the students in this study and national data may be due to the fact that this study specifically assessed sweet or salty snacks when consumed between meals, not with meals. However, sugary foods like pastries, and salty foods like chips and French fries, may be consumed with meals and thus were not captured in this study. Future data collection should consider inclusion of sweet and salty snack foods consumed at any time in the day.

Significant within group decreases in EDS (and both sweet and salty snacks when separated) and SSB consumption were found in the treatment group. Additionally, there was a significant between group decrease in EDS (and both sweet and salty snacks when separated) from baseline to post-assessment. These results are similar to Rosário et al. who found a significant decrease in energy-dense foods, but not SSB, when a classroom-teacher taught model of a 6-month nutrition education program was implemented for 6-12 year old students in Portugal.[41] Additionally, Sharma et al. did find a decrease in sugar consumption, though it was non-specific as

to if the sugar source was from food or drink.[22] Education focused on EDS and SSB can effect behavior change.

Nutrition education programs and multi-level, systems-based approaches[42] to decrease SSB consumption in children are much more common and have found that children exposed to these programs significantly decreased SSB consumption. [43, 44] This research study found a significant decrease in the treatment groups' SSB consumption from baseline to post-assessment, but the effect size was small and there was no intervention effect found over time. This is similar to other studies that saw trends or modest improvements in SSB consumption in low-SES, racial and ethnic minority youth.[26, 27] The lack of interaction effect over time may be due to in part to the timing of when the SSB lesson was taught (week 12). Given that it was at the end of the curriculum it is possible that the students had less time to implement a behavior change before the post-assessment (conducted in week 13). The length of time it takes to implement a behavior change is different for each individual, depending on where they are in the process of change.[45, 46]

Due to the study design and preference of the schools to ultimately receive the program, some but not all schools were used as both a control and treatment group. In addition, the study was conducted over several years. To overcome some of the limitations of this study design, paired t-tests were run for EDSAVG, sweet and salty snacks separately, and SSB for each treatment and control group involved in each year of data collection. These tests showed trends in the intervention's effect on the dependent variables when the same school acted as both a control and treatment group. For the two schools that acted as both control and treatment groups in different

years, it appears that when they were treatment groups, they had significant improvements in salty snacks and thus EDSAVG, but not when acting as a control school. This indicates that the intervention itself was effective in behavior change, independent of the school environment.

For the treatment group, across the three-year period, paired t-tests showed that the intervention had an effect on change, particularly EDSAVG consumption, not the school. Likewise, the control groups across the three-year period had very little behavior change from baseline to post-assessment. This indicates that the intervention is replicable with different environments (schools) and different students.

As there have been very few studies to evaluate changes in EDS consumption in children from a nutrition education program, this research adds to the much-needed body of literature.

Decreasing EDS and SSB consumption in children is important. Not only are those who consume SSB are more likely to consume EDS,[39] there is also an inverse association between EDS consumption and healthy dietary habits such as consuming FV.[29] These habits are also associated with health outcomes such as overweight and obesity,[30, 47-49] as well as cognitive outcomes such as executive functioning,[50] academic grades,[51, 52] and in-class behavior.[52]

Strengths and Limitations

There were several strengths to this study. The first is this study involved low-SES, minority and ethnically diverse students, a population that has been shown to

need more nutrition education than higher-SES populations to increase nutrition knowledge and combat the higher propensity to consume unhealthy foods and beverages.[53-55] The second strength was the low attrition rate throughout the study.[56] Third, researcher data entry error was very low since the data was electronically collected and downloaded into a data analysis sheet. Lastly, the data over the three years showed replicability with different students in different schools.

While there were several strengths to the study, there were also limitations. First, the self-recall survey was modified and not validated for that age group and asked about previous day's consumption at one-week day time point at baseline and post-assessment, which may not represent a typical week day's food and beverage consumption or be enough to capture a usual consumption.[57] In addition, recall was always on a week day, not a weekend, which limits its ability to capture day to day variability in consumption. Weekend eating tends to be different from weekdays.[58] The post-assessment was given directly at week 13, possibly not allowing enough time for implementation of behavior change as each student may be in a different stage of change.[45, 46] Lastly, the survey required self-recall by the 3rd grader. While the survey was administered via an online tool and may be more engaging to the students,[59] self-recall is shown to be difficult with children.[60] Electronic modes of collection such as digital imaging of lunch trays to assess consumption and variety of foods[61] and software included into cafeteria computers to assess student food choices,[62] should be considered for future data collection methods. Aside from the survey, another limitation included potential respondent bias by the students, especially at post-assessment, as they may have wanted to please the researchers now known to them

from the program.[63] Lastly, it was not feasible to have a randomized controlled trial, so some, but not all schools, served as both control and treatment groups, and they served as those groups in different years with different students. A design that uses the same students as both control and treatment group participants within the same school year is ideal to detect behavior change due to the intervention.

IMPLICATIONS FOR RESEARCH AND PRACTICE

As reported by students in this study and nationally, EDS are widely consumed on a daily basis. Results from this intervention show a technology-integrated, school-based nutrition education program is effective in improving EDS consumption in low-SES 3rd graders. Future programming should consider continued use of technology to enhance learning. It should also consider inclusion of EDS consumed at any point in the day, delayed post-assessment to allow students time to implement behavior change, alternative modes to dietary recall with children, and modified study design to eliminate potential bias and confounding factors.

Chapter One Figures and Tables

Figure 1: Participation of Classrooms per school, Students that Completed Baseline Data, and Students that Completed Baseline and Post-Assessment Data

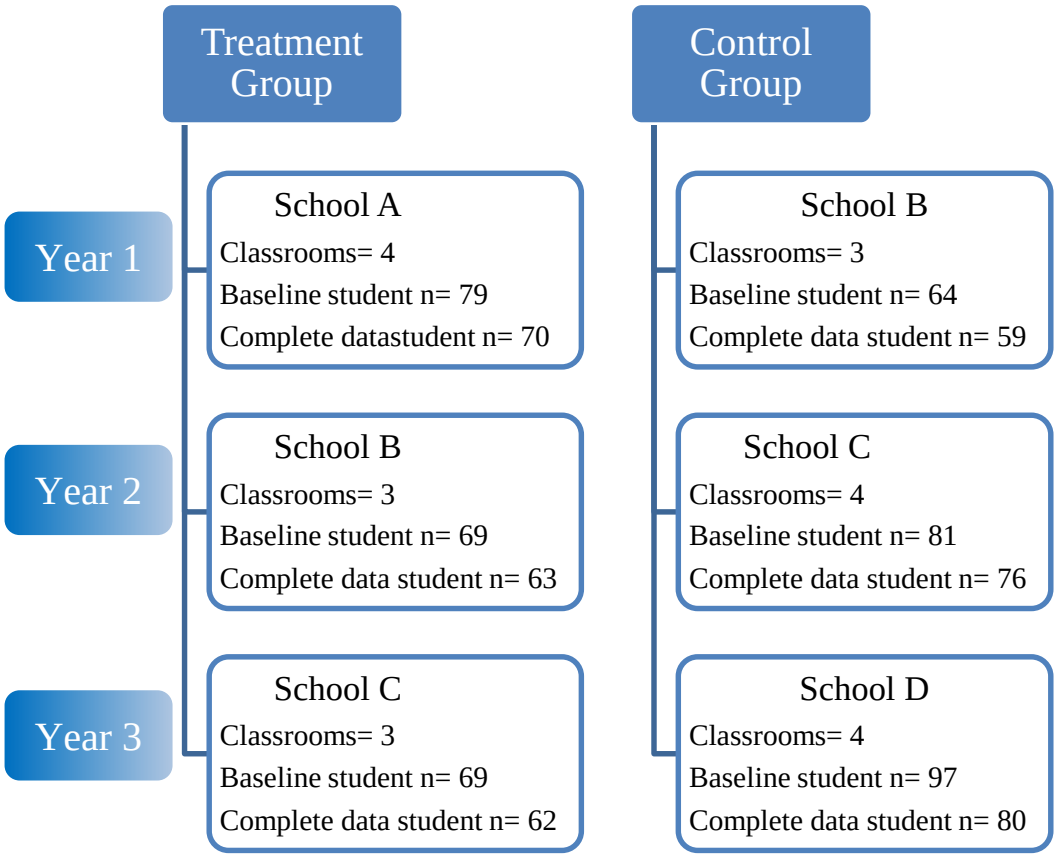


Table 1: Lesson Detail in the 13-week School-Based Nutrition Education Program

Lesson	Lesson Topics
1	Baseline Survey; Food Groups and BQ Character introduction
2	Trying new FV; Go, Slow & Whoa Food Groups; and iPad BQ Introductory App
3	Portion Sizes of FV and iPad BQ Activity 1 App
4	Eating Foods from All Food Groups and FV Variety
5	MyPlate and iPad BQ Activity 2 App
6	Balanced Meals and Adding FV into Meals & Snacks
7	Breakfast and iPad Activity 3 App
8	Function of Each Food Group and Fast Food
9	FV Functions of Each Color and iPad Activity 4 App
10	Snacks (sweet and salty)
11	Fiber and iPad Activity 5 App
12	Persuasive Messaging to Increase FV intake and Sugar-Sweetened Beverages
13	iPad Activity 6 App and Wrap-up of curriculum; Post-Assessment

Table 2: Baseline Demographic Characteristics of Treatment (n=217) and Control Students (n=242)

Characteristic	Treatment Group	Control Group
Involved 3rd Graders	**Students (n=217)**	**Students (n=242)**
Age in years (mean; range)[a]	8.29; 7-11	8.24; 7-10
Gender (% male)[a]	51.6	51.2
Race and Ethnicity[b] % Hispanic	63.0	62.0
% African-American	20.0	18.0
% Asian	5.3	5.0
% White	5.3	7.0
% Multiple Races	4.7	6.0
% Native American	1.7	2.0
Other children in the home (mean) [a]	2.51	2.57
Who make dinner most nights (% mother) [a]	71.8	70.9
Who does most of the family's shopping (% mother or father) [a]	83.3	81.8
Eligible for free- or reduced-meals (%)[c]	89.6	88.2
Consumed at least one sugar-sweetened beverage in previous day (%)	75.6	79.6
Consumed at least one EDSAVG (sweet or salty) in between meals in previous day (%)	88.0	88.4
Consumed at least one sweet snack in between meals in previous day (%)	72.4	77.9
Consumed at least one salty snack in between meals in previous day (%)	74.7	67.2

[a] based on student self-report
[b] based on Rhode Island Department of Education school-wide data www.infoworks.ride.ri.gov
[c] based on Rhode Island Department of Education school eligibility report http://www.ride.ri.gov/cnp/ProgramDataFinances/CNPProgramDataFinances.aspx
*Significant p values <0.05

Table 3: Within Group Changes from Baseline to Post-Assessment for Beverage and Snack Consumption Using Paired t-tests

Variable	Baseline	Post-Assessment	Within Group t-value	Effect Size (d)
Sugar-Sweetened Beverage (SSB) (mean ±SD) times in previous day				
Treatment (n=195)	1.72±1.64	1.31±1.33	3.124**	0.225
Control (n=214)	1.65±1.41	1.57±1.41	0.711	0.049
EDSAVG (Salty+Sweet/2) (mean ±SD) times between meals in previous day				
Treatment (n=195)	1.73±1.47	1.17±1.18	5.100***	0.365
Control (n=206)	1.78±1.53	1.63±1.49	1.348	0.094
Sweet Snack (mean ±SD) times between meals in previous day				
Treatment (n=195)	1.75±1.69	1.21±1.36	4.211***	0.302
Control (n=213)	1.90±1.65	1.71±1.68	1.525	0.105
Salty Snack (mean ±SD) times between meals in previous day				
Treatment (n=195)	1.70±1.69	1.14±1.33	4.133***	0.296
Control (n=208)	1.64±1.71	1.56±1.66	0.632	0.044

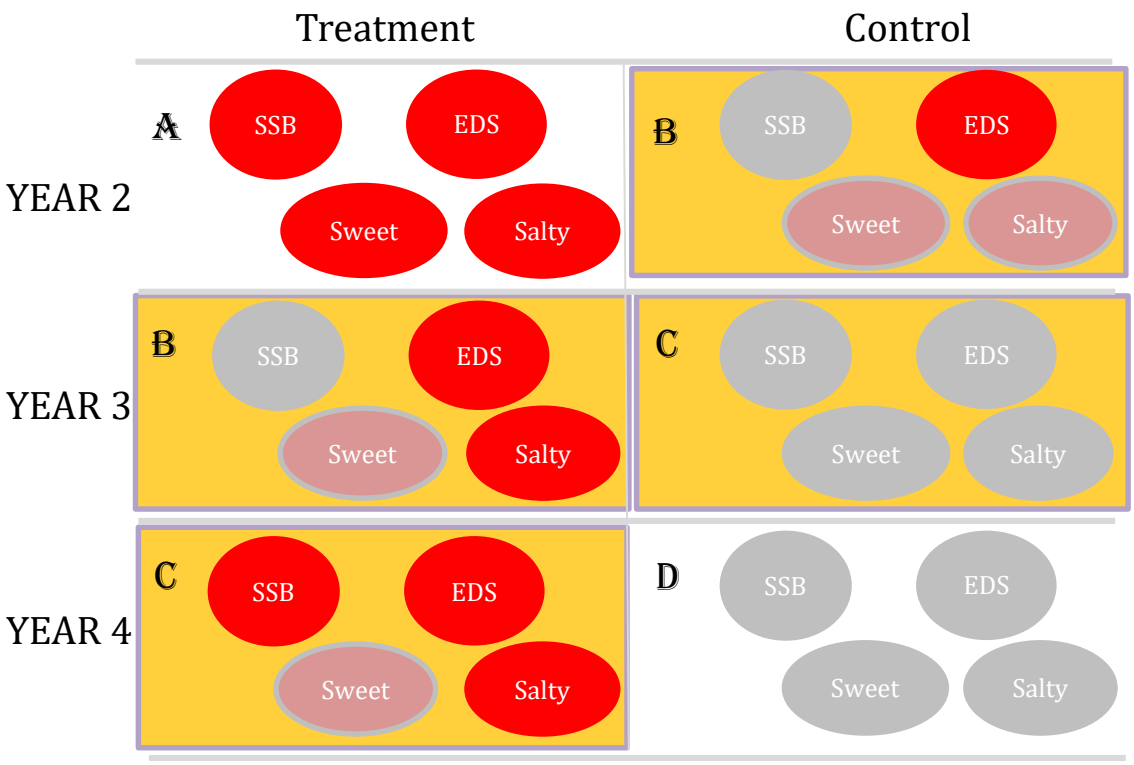
* significance at p<0.05, ** p<0.01, and ***p<0.001

Table 4: Between Group Changes from Baseline to Post-Assessment for Beverage and Snack Consumption using MANOVA and ANOVA Statistical Analysis

Variable	Baseline	Post-Assessment	Between Group F value (η^2, P)
MANOVA			
Sugar-Sweetened Beverage (SSB) (mean ±SD) times in previous day			
Treatment (n=195)	1.72±1.64	1.31±1.33	2.463 (0.006, 0.347)
Control (n=206)	1.68±1.42	1.56±1.41	
EDSAVG (Salty+Sweet/2) (mean ±SD) times between meals in previous day			
Treatment (n=195)	1.73±1.47	1.17±1.18	6.832 (0.017, 0.741)**
Control (n=206)	1.78±1.53	1.63±1.49	
ANOVA			
Sweet Snack (mean ±SD) times between meals in previous day			
Treatment (n=195)	1.75±1.69	1.21±1.36	3.979 (0.010, 0.512)*
Control (n=213)	1.90±1.65	1.71±1.68	
Salty Snack (mean ±SD) times between meals in previous day			
Treatment (n=195)	1.70±1.69	1.14±1.33	6.011 (0.015, 0.686)*
Control (n=208)	1.64±1.71	1.56±1.66	

* significance at p<0.05, ** p<0.01, and ***p<0.001

Figure 2: Paired T-Test Results for Baseline to Post-Assessment to Depict Trends in Behavior Change Results when 1) School Serves as both Control and Treatment Groups and 2) Intervention is Carried Out in Different Schools



Red circles indicated significant ($p<0.05$) within group changes from Paired t-tests

Pink circles indicate approaching significant ($p<0.10$) within group changes from Paired t-tests

Grey circles indicate no significant within group changes from Paired t-tests

Yellow boxes indicate schools that served as both treatment and control

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CHAPTER TWO

"Perceptions of Low-Income Students Completing a Nutrition Education Program"

by

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Objective: To capture student's perception of participating in a nutrition education program.

Design: Focus groups (n=16)

Setting: Low-income schools in Providence, RI

Participants: 64 low-income (93.5% free/reduced meals), ethnically and racially diverse (62% Hispanic; 16% Black) 3rd grade students.

Main Outcome Measure(s): Perceptions on program's impact on food and beverage consumption, the value of the program, potential changes for improvement, and barriers to change.

Analysis: Focus groups were recorded, transcribed, and coded using a hybrid approach of inductive and deductive thematic analysis. Inter-rater agreement was calculated.

Results: Students perceived that the program positively influenced their attitudes towards making healthy choices and what they and their families were eating. Students reported increased empowerment, bravery to try new foods and knowledge. Students enjoyed the program but suggested increasing the duration/frequency of lessons and including peer-to-peer education. Students felt that the tastiness of unhealthy food was a barrier to choosing healthier food.

Conclusions and Implications: Finding suggest that the program may have improved the student's knowledge, empowerment and bravery and this had a positive influence on healthy food consumption of the students and their families. Input from students will help inform future modifications to the curriculum.

MeSH terms: health education, child, sugar-sweetened beverages, snacks, qualitative research

INTRODUCTION

Obesity among elementary-aged children continues to be an important public health problem in the United States, especially among racial and ethnic minority populations. Hispanic 6-11-year-old children had the highest prevalence (25.0%) of obesity or extreme obesity in 2011-2014 compared to 13.6% non-Hispanic White children, followed by 21.4% of non-Hispanic Black children.[1] Contributing to the obesity epidemic among children is the excess consumption of energy-dense snacks (EDS) and sugar-sweetened beverages (SSB)[2-4] and not meeting the dietary recommendations for fruits and vegetables (FV).[5] Programs that successfully help children develop healthy eating habits are urgently needed.

While school-based nutrition education programs have helped improve what foods students consume, particularly FV,[6, 7] there is room for improvement. A recent meta-analysis found FV school-based nutrition education programs moderately increased fruit intake, with minimal improvements in vegetable intake.[6] One way to improve these programs is by incorporating student feedback into nutrition education programs. Conducting qualitative research with students provides meaningful information to improve programming.[8] Previous studies have found students' perspectives may help provide a more complete picture on how a school-based nutrition education program can impact what they eat.[9, 10] They may also provide insight into the students' perceptions of the program to help guide future programming.[9-12] However, few studies have incorporated feedback from low-

income, racially and ethnically diverse elementary-aged students. As this population is at higher risk for developing obesity, it is important to determine how to best intervene, from their perspective, to promote healthy eating habits.

There have been limited opportunities for low-income, racially and ethnically diverse elementary-aged students to share their perceptions regarding nutrition education programs through focus groups. This research article aims to fill this gap. This article describes the results of focus groups conducted with low-income, racially and ethnically diverse 3rd graders who completed a 13-week school-based nutrition education program through the University of Rhode Island's Children Youth and Families at Risk (CYFAR) project, *Integrating Nutrition Education into Providence Full Service Schools in Providence, RI.* The objectives of the focus groups were to determine student's (i) perceptions on how the program impacted their food and beverage consumption, (ii) perceptions of the overall program and potential changes for improvement, and (iii) overall barriers, independent of the program, to eating behavior change. It was hypothesized that students would report positive eating behavior changes due to the program, find the program desirable, and would reveal barriers that prevent children like them from having healthy eating habits.

METHODS

Study Design

This study assessed perceptions of students who participated in one component of a larger multicomponent intervention conducted through a 5-year United States Department of Agriculture (USDA) CYFAR grant awarded to the University of Rhode Island's Providence Community Nutrition office. Participants were low-income 3rd grade students in Providence. There were three intervention schools and three no-treatment, control schools. The intervention consisted of a weekly one-hour in-class program for 13-weeks, designed to decrease children's EDS and SSB and increase FV consumption. The program's curriculum was based on the Social Cognitive Theory[13] and Experiential Learning Theory[14] and utilized a modified version of *Body Quest: Food of the Warrior* curriculum created by the University of Alabama.[15] Curriculum content included food group function and the concept of "Go, Slow and Whoa"; FV amounts, variety and importance; EDS, including both salty and sweet snacks; and SSB. The curriculum used interactive, hands-on activities as well as iPad applications to reinforce topics taught by the educators who were registered dietitians.

This paper describes focus groups conducted with students who completed the 13-week program in two treatment schools.

Participants and Recruitment

Sixteen focus groups with four 3rd grade students in each group were completed.[16] Sixty-four out of a possible 138 students who received the program were willing to participate and were selected by the classroom teacher. The classroom teacher was instructed to select students of both genders, all learning levels, and who had attended the nutrition program throughout the school year. Thematic saturation was reached after 16 focus groups in two schools were conducted. URI's ethics committee granted internal review board approval for this research study.

Procedures

Conducted during the school day approximately two months after completion of the 13-week program, all focus groups were held in quiet locations within the school the students attended. [17, 18] The focus group guide was developed based on prior literature and organized in to five sections: influence of food selection, memorable topics from the curriculum, perceived behavior change from the program, barriers to behavior change, and potential changes to the program. The focus group guide was pilot tested with a small group of same-aged children (n=4) for comprehension and clarity of questions. Table 1 provides details of question asked. Each focus group lasted approximately 20 minutes and was audio-recorded and included the lead researcher as moderator and the nutrition educator as note taker, both of whom the students knew through the program. When doing qualitative research

with children it is important to establish rapport and felt it was important to have a familiar face to increase responses and comfort. Data saturation was reached when coding of data revealed no new themes.

As part of the 13-week program, demographic information was collected during an in classroom baseline assessment. Children responded to questions developed specifically for USDA CYFAR on individual iPads. School-wide information on Providence from the RI Department of Education was also collected. To enhance clarity of questions, some USDA CYFAR items were modified. Modifications included asking the students if they spoke Spanish at home; this replaced asking if they were Hispanic. Additionally, "other" and "not sure" categories were added as options to the race question, as some students did not identify with any option provided or were unsure.

Data Analysis

Audio-recorded focus groups (n=16) were transcribed verbatim by a professional transcription service, Verbal Ink, and were reviewed by the focus group moderator and note taker for accuracy. Each transcript was coded using a hybrid approach of inductive and deductive thematic analysis.[19] This approach acknowledged the sections in the focus group protocol and also included any additional themes that emerged from the data during the coding process. The lead researcher utilized thematic analysis to detect themes from the content of the transcripts.[20] A codebook of structural and content codes was created and updated based on transcription readings.

A second researcher (author #4) coded 25% of the data and inter-rater agreement was calculated. There was a 94% agreement of coding, determined by the number of agreements divided by the sum of agreements and disagreements. These codes led to patterns and themes within each section. Descriptive statistics summarized student demographic characteristics based on survey data and were analyzed in IBM SPSS software (version 24.0, IBM Statistics, Armonk, NY, 02016).

RESULTS

The focus groups were comprised of students who were an average of eight years old, 62% reported speaking Spanish at home, and 16% reported as non-Hispanic Black (Table 2). Overall, students discussed many of the changes they and their family made as a result of participating in the program. In addition, they also discussed what factors influence their food choices, what aspects of the program were most influential in their perceived behavior change, and what they think could be changed in the future. Each of the questions from the moderator guide were organized into the five original sections; four appeared as themes during analysis and one new theme emerged. The results are organized by themes and additional supporting quotes are found in Tables 3 and 4.

Theme 1: Influence on Food Selection

As part of the icebreaker activity in the focus group, two food options were shown to the students; one of a typical fast food restaurant food such as a cheeseburger, and one of a typical healthier option such as a grilled chicken sandwich or turkey sandwich on whole wheat bread. The students were asked to point to which food they would eat if given the choice. Forty out of 64 (63%) students chose the healthier option. The common reasons for selecting the healthier option were that it was the healthier choice and that it had vegetables on it. When asked why they chose the healthier option, one student replied:

"*Because it looks more healthier. This [cheeseburger] has meat and this [turkey sandwich] has tomatoes and lettuce."*

The less healthy option was selected most commonly for its appealing taste. This theme also carried over into the discussion on barriers to eating healthy. During that discussion, students stated that they still consumed unhealthy foods and beverages because they taste good and also because they get sick of eating only healthy foods. When asked why they eat unhealthy foods, one student replied:

"I eat ice cream every day because it tastes good, and I just want to sneak up so I can have something … I can have something sweet and then eat something healthy."

When asked how they felt when eating the unhealthy foods and beverages, most responded negatively, mentioning that the unhealthy foods make them feel "not that great" or "it feels, like, badder", but a few responded positively ("I'm happy because I eat chips"). Yet, students still consume these products, and as one student summed it up:

"I feel like … they're not kind of good for me but they taste so good."

Theme 2: Perceived Behavior Change from the Program

While the curriculum did not emphasize empowerment specifically, students reported feeling more empowered to influence what they were eating at home as a result of participating in the program. This increased feeling of empowerment was reinforced by students who stated that they asked for healthier items in the home and often times reported that because of this, their parents would buy those items. One student stated:

"Before I ate chips and everything, and now I eat a little bit of candy. I tell my mom to buy me baby carrots, grapes, watermelon. She buys me and I eat it. I tell her to keep our family healthy."

The students also reported that by sharing what they learned in the program with their families, family members also changed their eating habits. Students stated that they appreciated this aspect of the program.

"You can tell your whole family and then your whole family will live longer and healthy life."

Aside from a perceived influence on their families and home environment, the students talked about how the program was helping them make healthier food choices. Students reported that they began to limit unhealthy foods and drinks not only by decreasing how often they have them, but also by replacing them with healthier choices.

"I think I'm making a great decision because I'm getting salad instead of, like, hamburgers and chicken nuggets."

Students also stated that they became braver to try new foods, specifically fruits and vegetables. This bravery was a major theme of the *Body Quest: Food of the Warrior* curriculum, which clearly resounded with some students. Students were encouraged every class to be brave *Body Quest* warriors and try new, healthy foods.

"And Miss [teacher's name], sometimes when she comes in, she ask us, like, whoever tried this, whoever tried that, and we raised our hands. [I had] the okra for snack."

Theme 3: Memorable Topics

Certain topics the curriculum covered resonated with the students more than others. The most memorable nutrition topics included learning about sugar content in drinks and which drinks are healthiest, how fruits and vegetables help your body, consequences of eating healthy and unhealthy foods, "Go, Slow and Whoa" foods and drinks, and the concept of moderation so all foods can fit in their diet. Students attributed making healthier changes to learning about what healthier choices were, and why to consume them.

"I would just eat candy all the time, but now that you guys talked to us and said that it's good to eat healthy, I learned that getting healthy means that you can get stronger and more powerful and more beautiful."

Specific to the *Body Quest* curriculum, the most memorable topics were learning about the characters and using the iPad applications. The *Body Quest* curriculum is unique because of its six characters that represent healthy eating habits.

They were introduced to the students through posters hung on classroom walls, activities during the lesson, and the iPad applications.

"We get to talk about food, what makes you healthy and the Body Quest people. We got to go on the tablet and we get to learn about, uh, vegetables."

Theme 4: How to Make a Topic Memorable

Overall, students reported that the hands-on activities influenced their learning experience. Hands-on activities included *Body Quest* playing cards (used in seven lessons), four learning kits such as "Think your Drink" and rubber breakfast food models, nine interactive boards and games such as "Fruit and Veggie Bingo", the seven iPad applications, and use of paper and pencil (used in four lessons).

"I really liked using the [rubber] food models because they look like real food and we could just see if we could change the Coco Puffs into Raisin Bran."

Students also reported that if the activities were fun they were more likely to remember the content and apply what they learned to their own experiences with foods.

"I liked when Ms. [teacher's name] passed out these, um, cans that were unhealthy and healthy drinks…it was actually surprising to see how much I actually drank of that soda and I don't even pay attention to the labels on the back."

Theme 5: Potential Changes to the Program

Overall, the students reported enjoying and being satisfied with the 13-week program. However, students provided suggestions on how to improve the program, including duration and/or frequency and possible curriculum modifications. In all focus groups, students reported wanting longer and more frequent sessions throughout the school year.

"You should have done the classes on Monday because you would have had more time because Fridays are shorter days so we had shorter time with you."

One curriculum modification the students suggested was peer-to-peer education. They suggested having students like themselves taking on the role of the teacher and explaining nutrition topics to their peers. Other suggestions included having new iPad application games based on ideas the students came up with, more time for doing and recapping the iPad applications, and fewer topics on what the students should not eat and more on what they should eat.

"You should do a game [on the iPad] like that like they ask you questions and then like they ask you a question about stuff to be a body warrior, and you could be a body warrior."

DISCUSSION

The goal of this study was to capture the perceptions of low-income, racially and ethnically diverse 3rd grade students who participated in the URI CYFAR in school program. Findings from this study highlight the struggle that 3rd graders have between what they know is healthy and what tastes most appealing to them. It also suggests that the program may have improved the student's knowledge, bravery and empowerment; students felt that because of this they and their families were choosing to eat healthier foods. Lastly, it provided detailed information for future modifications to the curriculum with regards to specific topics and how to best teach those topics.

Knowledge and Action Conflict

In conversations about food and drink choices, the struggle between what the students know to be healthy and what they consume based on what is most taste appealing came up repeatedly. These conflicts between knowledge and behavior are similar to what previous research has found in that children, adolescents, and even adults, find it difficult to refrain from unhealthy food because of its appealing aesthetics and taste.[21-23] Battram et al. found that although children related sugar content with healthfulness of the drink, taste and preference dominated the children's choices.[21] Students in this study reported similar reasons for food and drink choices. Stevenson et al. reported that adolescents found eating unhealthy food as rewarding

because they found the taste more appealing than healthy food.[22] This result is similar to the students in this research study as they stated that the unhealthy food options tasted better. Tiedje et al. found that adolescent and adult immigrants and refugees craved unhealthy food.[23] This is also similar to the students in this research study as they reported that they craved food, even if they knew it was not healthy for them. Future studies should explore ways to resolve this dissonance among elementary school aged children.

Methods previously found to align knowledge with behavior are to repeatedly expose students to healthy options and to decrease access to unhealthier ones. Evidence suggests that repeated exposure to foods increases the likability and acceptability of the food.[24] Therefore, if schools and families repeatedly expose students to healthy options for meals and snacks, the students' perception of healthy food's appealing taste may change. This may lead to social norms changing over time, as was seen with the 2010 Healthy, Hunger-Free Kids Act, changes to school meals increased acceptability by students over time.[25] The environment in which the students spend time also determines food and drink choices. This includes their home, school, and surrounding neighborhoods. Shifts within environments have been show to alter eating habits.[26-28] Continued efforts to establish healthy eating norms in different settings where elementary aged children spend time is critical.

Students' Perceived Behavior Changes

Students may still consume unhealthy food and drink choices; however, they perceived that the 13-week program helped them to make positive behavior changes. This finding is similar to what others have reported in that students decrease unhealthy foods and also replace unhealthy with healthy options after receiving school-based nutrition education programs.[15, 29-32] While most school-based nutrition education programs have focused on FV as their main outcome assessment, this study focused on EDS and SSB. Decreasing EDS and SSB with the potential to replace these unhealthy items with healthy FV choices is imperative as United States national data shows students are not meeting national recommendations.[5, 33-35] Students are both overconsuming EDS (both sweet and salty snack items) and SSB and under consuming FV.[5, 36, 37] Curriculums that focus on decreasing EDS and SSB, but employ other concepts to help initiate change may help improve the eating habits of children.

One of the core principles of the *Body Quest* curriculum is the use of "bravery" which may have positively contributed to the student's perception of making changes to their behavior. The curriculum emphasized bravery by continually encouraging the students to try new, healthy foods, specifically fruits and vegetables. This emerged as a theme during the focus groups, as the students repeatedly reported that because of this encouragement, they tried various fruits, vegetables, and other healthy foods and drinks that they had either never tried before or did not like previously but tried again. Part of the bravery concept included the use of repeated exposure of a food or drink

item to help increase the chance of liking it. Thus, the students were repeatedly encouraged to try food and drink items.[24] Influential adults such as teachers and parents can practice positive feeding practices and encourage the students to continue to try new healthy foods and drinks.[38]

Like bravery, empowerment was another concept that may have contributed to student's perceived eating behavior changes. Empowerment, "the process of becoming stronger and more confident, especially in controlling one's life and claiming one's rights",[39] when increased may lead to behavior changes.[40] A number of nutrition interventions have influenced student empowerment leading to behavior changes in the home.[41-44] Although empowerment of students to make changes in their households was not a major focus of this curriculum, empowerment emerged as a theme. Students shared information with and made requests to their families based on what the class taught. This interaction not only helped instill positive behavior changes in themselves, but also their families. The successful change in families found in this study is similar to other research that focused on students as agents of change.[43, 45, 46] Heim et al. found both an increase in empowerment and fruit and vegetable availability in the home following their garden-based intervention.[43] Since many school-aged students do not shop or cook for themselves, it is imperative that the nutrition messages be communicated to the family members that influence the majority of the food home-life. In this program, families received take-home handouts in English and Spanish on relevant topics each week. However, it is unknown how often families read those messages. What may have proven more successful in influencing the home environment was the student's transfer of knowledge from the

classroom to the home environment. Such knowledge included eating healthier meals that include more fruits and vegetables and having less unhealthy drinks. This study, along with other nutrition education studies, show the importance and need for continued school-based nutrition education to influence whole-family behavior change.

Informing Future Programming

In order to help instill positive behavior changes in the students and their families, the curriculum needs to be relevant to the student and taught in a way that best engages the student. Overall, the students liked the curriculum and its activities. This is similar to what previous qualitative research studies with school-aged students have found in that the students like the programs, especially the technology components.[9, 10] Five nutrition topics, along with the *Body Quest* warriors and use of the iPad applications, stood out the most by students: drinks (SSB and milk), how fruits and vegetables help your body, consequences to eating healthy and unhealthy foods, "Go, Slow and Whoa", and the balance of healthy and unhealthy foods. This information is helpful when planning sustainable school-based programs. In order for programs to be sustainable after funding ceases, the program needs to be feasible for use by the school community. This may mean having a flexible program that the schools can adapt as needed.[47] Therefore, when considering school use and sustainability of the nutrition education program, having an emphasis on "must have" curriculum topics that are most salient to students, with optional add-on topics as time

permits, is a reasonable compromise to nutrition education conducted by the school staff. In addition, the curriculum's delivery method and its appeal by the students may influence sustainability.

How a topic is taught is equally as important as what is taught. The students' perception that hands-on, fun activities, particularly use of the iPads, are the best delivery modes to increase retention of concepts aligns with the two theories this research project is based on: the Social Cognitive Theory and the Experiential Learning Theory. The Social Cognitive Theory's constructs of behavior capability and self-efficacy, and the Experiential Learning Theory's concept of experience, all tie concrete experiences with change.[13, 14] When the students have the opportunity to actively engage in a topic and make it applicable to themselves, the chance of behavior change increases.

Overall the students had positive feedback on the program, however, the students did have some critical feedback to consider. Critical feedback included increased time to use and discuss the iPad applications, having more peer-to-peer education, and an increased focus on nutritionally sound foods and drinks to choose as opposed to focusing on foods and drinks not to choose. This feedback will help plan future programming to focus on topics pertinent to students and the best ways to present such topics.

Strengths and Limitations

There are several strengths to this qualitative research study. First, this research focused on the perceptions of low-income, racially and ethnically diverse 3rd graders, a population that has not been an emphasis in qualitative research. Second, the focus groups were conducted with a large number of students (n=64) to the point of saturation. This allowed for the maximum amount of information to be provided by the students to comfortably conclude that the opinions of these 64 students would resonate as opinions by the other 3rd graders involved in the program. Third, the focus groups included a moderator, note taker and were recorded and professionally transcribed. This created verbatim data with no bias by the note taker. Fourth, the same moderator and note taker were utilized in all focus groups to ensure consistency.

While recommended protocols for conducting focus groups with children were followed, some aspects of the protocol also serve as limitations. First, use of staff known by the students during the focus groups may have affected how the students responded. Respondent bias can come into play if the students respond to answers based on what they think will please the moderator.[48] This was evident in one student response during unhealthy choices dialogue. Second, because the qualitative research involved small groups of students, there may have been social desirability bias, with students influencing the others students' responses.[48] Lastly, the outcomes of this qualitative research cannot be generalized to the whole population as the 3rd grade students involved in the research were low-income and racially and ethnically diverse.

Conclusions and Implications for Research and Practice

The perceptions and attitudes of students, particularly low-income, racially and ethnically diverse elementary-aged students, are often not captured. This qualitative research study adds to the literature on why behavior change is so difficult, aligning with the Transtheoretical Model, which focuses on motivational readiness to change.[49] Knowledge of barriers to eating healthier foods may help better tailor future interventions and programs. Results from the focus groups also revealed how students can feel empowered to make changes not only to their own habits but to that of their families. Lastly, the students were able to express their enjoyment of the program, inform the researcher on topics and mode of delivery that impacted them most, and offer ideas of how to improve it for the future. This information is vital to expanding nutrition education programs out into the community in a sustainable way.

Future research should include evaluating and revising programs based on student suggestions. In addition, a pilot of the program taught by school staff should be conducted to assess the potential for sustainability.

Chapter Two Figures and Tables

Table 1: Sections of Focus Group Guide

Initial Question	Expected Theme
Let's start with looking at some pictures *(have a piece of paper with two choices, one healthy and one unhealthy)*. Which would you choose to eat? Why?	Influence on food selection
What do you remember learning last year in the class I taught?	Memorable topics
Did anything you learn help you change the foods you eat and drinks you drink?	Perceived behavior change from the program
What are some things that you may be doing that you think may <u>not</u> be healthy? Can you tell me more about that?	Barriers to behavior change
Does anyone have anything else you would like to say about the nutrition program last year?	Potential changes to the program

Table 2: Baseline Demographic Characteristics of Students and Schools Involved in the 13-week School-Based Nutrition Education Program

Characteristic	School 1	School 2	Mean of Schools
Involved 3rd Graders	**Students (n=69)**	**Students (n=69)**	**All Students (n=138)**
Age in years (mean; range)	8.30; 8-11	8.30; 7-10	8.30; 7-11
Gender (% male)	46.4	49.3	47.8
Ethnicity (% Hispanic)[Ŧ]	65.2	58.0	61.6
Race			
% American Indian/Alaskan Native	17.4	11.3	13.8
% Asian	2.9	7.3	5.07
% Black	11.6	20.3	15.9
% Native Hawaiian/Pacific Islander	0.0	1.5	0.7
% White	11.6	8.7	10.1
% Other	15.9	21.7	18.8
% Not sure	33.3	29.0	31.2
% Multiple races	7.3	1.5	4.4
Eligible for free- or reduced-meals (%)[a]	92	95	93.50

* Indicates significant differences between groups at baseline
[Ŧ] Hispanic ethnicity based on the response to the question "Do you speak Spanish at home?"
[a] http://infoworks.ride.ri.gov/school

Table 3: Representative Quotations from Post-Intervention Focus Groups Regarding Behaviors of Students Involved in the 13-week School-Based Nutrition Education Program (n=64)

Themes and Sub-Themes	Related Quotes
Influence on Food Selection	
Healthy Food Selection	It looks so much healthier than eating all that grease. [It] has salad in it, and it has tomato, and it also has the- I know it has the protein. The thing is more healthier for you than a burger. Because if I choose the cheeseburger and I just ate cheeseburgers, then I would be like Trans Fat Cat.
Unhealthy Food Selection	Because it's yummier. Eating sweet foods [before] bed…because I just wanna eat something yummy instead of healthy foods sometimes, because I eat too much healthy food and I need a break. I still eat my chocolate fudge round cakes. And they're so good. You can just never stop eating them.
Perceived Behavior Change from the program	
Student Empowerment	I told my mom that, to buy healthy things now because they- it will help my body. I told my mom that you two teachers told me not to eat, um, too much junk food. So now every time I go to, like, BJs or food markets, I start getting- my mom starts buying me vegetables and she doesn't give me any junk food or anything. That every time when I eat dinner, my parents always give me soda and I say, 'no, don't give me soda, because save the soda for special occasion' and then they give me juice or water.

Perceived Influence on Family Behavior	I always ask my dad 'can we go and buy some Subway?' so he sometimes says yes and sometimes says no. So now in these times, actually, we don't go too much to those places. Now we just go to the supermarket and buy some vegetables, fruit, rice and chicken. I really liked [the program] because right after we were done I started teaching my mom all the things that you showed me and now my mom is getting into different healthy food habits. It [program] helped my little brother. Because every time when he went to lunch at school, he- my dad, would always used to pack him, like four or five really junk snacks. Now I told my dad about it and now he gets two apples, grapes and chips, um broccoli and oranges.
Perceived Student Behavior Change	Now instead of eating large French fries, I eat small French fries. I liked [the program] because all the stuff I eat, I didn't even know that it has sugar and salt. I didn't know what was happening until you came and taught me all about it. And then I stopped eating it. I'm starting to eat the school vegetables instead of bringing my own, um, junk food like chocolate chip cookies.
Student Bravery	I started eating different fruits and vegetables that I've never tried before. I've been trying strawberries, grapes. I just have one thing to say is that when I was little, I didn't wanna eat yogurt. I didn't like yogurt. Now, I'm eating the whole cup of yogurt. You told us to try new foods, like I never liked celery, but then I tried it and I liked it.

Table 4: Representative Quotations by Students (n=64) from Post-Intervention Focus Groups Regarding the 13-week School-Based Nutrition Education Program

Themes and Sub-Themes	Related Quotes
Memorable Topics	
Nutrition Topics	We learned to not eat so much sugar and not to drink grown up drinks, and not to drink a lot of like, coffee stuff. You have to eat vegetables like carrots so you can be very healthy, your body, because if you go to the hospital they might say 'have you been eating vegetables?' and you could say 'yeah, so my body could be healthy', and for your eyes. I learned to eat a variety and not just eat one color [of fruits and vegetables] because that means that your body isn't getting that much of the colors that it needs on your body. If you have whoa foods, those are only for parties and stuff like that. Instead of picking a big French fry, picking a small French fry. Instead of picking a Big Mac, picking a small cheeseburger.
BQ-Specific Topics	And don't eat unhealthy food because you will be like [Trans] Fat Cat. The body quest warriors. They had some powers about the food groups I remember that we used the [iPads] so that we can eat more healthy foods, and we can get healthy. We did the six of them.

How to Make a Topic Memorable	
Hands-on Learning	I remember when we were playing [fruit and vegetable] bingo…and then we would put something on [the card], and then we would talk about it, like what meals would you have with it. I think it was a game or you showed us about all like soda and all that stuff that had the sugar packets. I remember where we took a plate and we had to draw food that were healthy and fruit, dairy, protein, grains and vegetables and then we made a snowman [out of the plates]. When we used the iPads, we learned more about the characters.
Making Topics Fun	The part that I enjoyed most about the class is how you made learning what- about healthy and unhealthy- you turned it into more exciting. That it was fun when we'd do activities, and we've always been doing it like with the exercises to help our bodies. It was fun and it was very cool because it's good to learn about healthy food.
Potential Changes to the Program	
Duration and/or Frequency of the Program	What I want to change is that if you could have stayed more time with us. The thing that I wanted that is different, I wanted that it happens that we stay more longer in a class to learn more. What I would like to change about the program is that sometimes they should add more days like not just Wednesdays, they should do it Tuesdays, Fridays, Saturdays.
Curriculum Changes	We would be the teachers. Instead of learning about sugars we could learn about other stuff that are in healthy food. A game where we have a shield and a sword, and they're healthy. Then we can go to battle with unhealthy things…We can go fight with germs and everything. If you could talk about how sports are also good for your body If we have extra time, we can have like free time on the iPads.

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CHAPTER THREE

"Active Parent Engagement in a School-Based Nutrition Family Program: Methods, Successes and Challenges"

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ABSTRACT

Extension professionals can actively engage parents in nutrition education programs to improve their parenting practices and their child's nutrition-related behaviors. In order to improve future programs, it is important to understand what facilitators and barriers are for low-income families. The purpose of this article is to describe the methods, successes and challenges of a school-based nutrition education family program. Twenty-five (25) racially and ethnically diverse, low-income 3rd graders and their families participated in the 6-week program. Having children attend the program along with their parents increased recruitment and, along with reminder text messages, helped with retention. Parents improved their parenting practices and both parents and students improved nutrition-related behaviors. However, findings novel ways to engage and retain families are important in order to sustain involvement in a community outreach program.

Keywords: family, nutrition education, children, low-income, school-based

INTRODUCTION

According to 2007-2010 National Health and Nutrition Examination Survey (NHANES) data, children 6-11 years old consume 37.8% of their daily calories from energy-dense snacks (EDS) and sugar-sweetened beverages (SSB), well-above recommendations (Bleich & Wolfson, 2015; U.S. Department of Health and Human Services, 2015; U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015). Meanwhile, they also under consume fruits and vegetables (FV) (U.S. Department of Health and Human Services, 2015). These dietary patterns are especially true for lower socio-economic status (SES) and ethnic minority children (Cameron et al., 2012; Drewnowski & Rehm, 2015; Dubowitz et al., 2008; Dunford & Popkin, 2017). Unfortunately, consumption of EDS and SSB, as well as lack of FV consumption, are associated with excess weight and increased risk for chronic diseases. Targeted nutrition outreach and education around decreasing EDS and SSB and increasing FV for families with school aged children is urgently needed (Centers for Disease Control and Prevention, 2016; Lakkakula, Zanovec, Silverman, Murphy, & Tuuri, 2008; Malik, Schulze, & Hu, 2006; Nicklas, Yang, Baranowski, Zakeri, & Berenson, 2003; Pem & Jeewon, 2015; Pourshahidi, Kerr, McCaffrey, & Livingstone, 2014). Given that children are a captive audience at school, this setting provides an ideal place for this nutrition outreach and education. Although targeting only children may help to change behaviors, parents play a critical role in shaping the child's environment and their behaviors and should be included in education efforts (Vaughn et al., 2016).

Parental involvement in nutrition education programs remains a challenge. The most common method of involving parents is through indirect education such as newsletters (Baranowski et al., 2003; Kitzman-Ulrich et al., 2010; Struempler, Parmer, Mastropietro, Arsiwalla, & Bubb, 2014). Active involvement has been shown to be successful in changing both parent and child behavior, yet is sparse, especially among low-SES populations (Gruber & Haldeman, 2009). This may be due to barriers such as time to attend programs, programs not being conducted in their native language, and lack of care for other children during the program (Benavente, 2009; Mytton, Ingram, Manns, & Thomas, 2013). In 2013, the University of Rhode Island (URI) Cooperative Extension's Providence Community Nutrition office received a 5-year grant to engage low-SES school-aged children in nutrition education. This was an opportunity to actively engage parents in a family program. This article describes the program and the challenges and successes.

METHODS

A 6-week "Family night" program was a part of a multicomponent 5-year United States Department of Agriculture (USDA) Children, Youth and Families at Risk (CYFAR) grant awarded to URI's Cooperative Extension's Providence Community Nutrition office. This grant focused on improving dietary behaviors of low-SES 3rd graders. Over a three-year period, three intervention schools were involved. The University of Rhode Island's ethics committee granted internal review board approval for this research study (IRB#HU1415-015).

Participants

The participants were 3rd grade students and their families from Providence, Rhode Island. An average of 87% of public school students are eligible for free or reduced-school meals (Rhode Island Department of Education, 2017) and the city population is 38% Hispanic/Latino and 16% Black/African-American (U.S. Department of Commerce, 2015). Over three years of data collection, 25 3rd graders and their families from treatment schools participated in the "Family Night" programming (12% of eligible families).

Recruitment

Initially, the "Family Night" program was just a program for parents. Recruitment was through collaboration with a previously-established community group program in the school. However, very few parents of 3rd graders became involved, thus new groups were created through cold calls to parents, advertisements and sign-up sheets during school events, and talking to parents during school drop-off and pick-up times. Unfortunately, these newly formed groups had poor attendance and through conversations with partners, it was deemed unsuccessful. It was noted however that for the parents that did attend, they often brought their children with them. As a result of this, the program format changed into a "Family Night" program for parents and children together.

Over the three years of programming, several recruitment methods were employed and refined in an effort to enroll a maximum number of families into the "Family Night" series. Figure 1 describes those methods.

Program and Retention

The "Family Night" program ran for 1.5 hours for six consecutive weeks. It included two sections: a 30-minute family dinner followed by a 1-hour education for children and parents. During the family dinner, children and parents ate a dinner prepared and served by outreach educators. All dinners included a low-cost, healthy recipe along with a side salad, milk or water, and fruit for dessert. During dinner, the outreach educators modeled positive parenting practices and reinforced nutrition concepts taught throughout the program. After dinner, parents and children received their 1-hour of education separately.

During the 1-hour of education, the children received a brief nutrition lesson and spent time on iPads to create content for a program recipe book, but much of the time was spent doing hands-on cooking activities. Using a modified version of the *Cooking with Kids* curriculum, children had the opportunity to prepare, cook and sample the recipe served to them for dinner that evening (Cunningham-Sabo & Lohse, 2013). This showed the ease of making the recipe and motivated the children to try the recipe if they had not during dinner.

The parents received a modified version of Cornell University's *Healthy Children, Healthy Families: Parents Making a Difference!* curriculum (Lent, Hill,

Dollahite, Wolfe, & Dickin, 2012). It taught nutrition topics and positive parenting practices that can help improve nutrition and physical activity behavior changes in the home. Parents also learned how to make small, attainable goals to slowly make behavior changes. These 1-hour lessons were conversational and interactive between the outreach educator and other parents.

If families attended the first week of the 6-week program, the outreach educators focused on ways to retain the families. The primary tactics were phone calls or SMS text messages, which included reminders to the parents a few days before and the day of the program. In addition, children were told at the end of the night's program what recipe they would be cooking the next week to instill excitement to return, families received weekly raffle tickets to encourage attendance, classroom teachers or "lead" communication teachers received SMS text messages to remind students of the evening's program, and classroom teachers were invited to participate in the "Family Night" program.

DATA COLLECTION AND ANALYSIS

Attendance of parents and children were taken weekly. Parents and children each completed baseline (week 1) and post-assessment (week 6) surveys to assess changes in dietary behaviors including EDS and SSB consumption (Neuhouser, Lilley, Lund, & Johnson, 2009), confidence with cooking (Lohse, Cunningham-Sabo, Walters, & Stacey, 2011), and positive-parenting practices (Musher-Eizenman &

Holub, 2007), as appropriate. The surveys were written in English and Spanish and completed on iPads.

All statistical analysis for this project used IBM SPSS software (version 24.0, IBM SPSS Statistics, Armonk, NY, 2016). Descriptive statistics provided frequencies and paired t-tests determined changes over time. Significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

Prior to including children in the program, only two parents became involved. However, after inclusion of children, eight families completed the program in year 1, followed by seven families in year 2 and 10 families in year 3. Similar to other education programs, efforts were made to reduce barriers such as providing child care and conducting the education in their native language (Hand et al., 2014). Several methods were employed over the three years, however, unforeseen conflict of time by the family was often anecdotally cited to be the reason families did not ultimately attend the program.

While parents may have enjoyed the program, parents reported that it was because of their children's encouragement that they ultimately attended the program. This is similar to other studies where child enjoyment being the primary reason for parental involvement. (Story et al., 2003). The students enjoyed the cooking program, and were always excited to hear what the next week's program would include. In addition, weekly SMS text messages sent to parents/caregivers also aided in retention.

Text messaging has shown to be an effective reminder to parents (Aragones, Bruno, Ehrenberg, Tonda-Salcedo, & Gany, 2015).

Of the parents that completed the program (n=25), 95.6% improved in at least one parenting practice (out of 16), with 25% improving in one practice, 20.8% improving in three practices, and 12.5% improving in five practices. Paired t-tests revealed a significant increase in how often parents thought about healthy food choices when feeding their family from baseline to post-assessment by M=1.12 days a week, 95% CI [0.33, 0.43], t(24)=3.36, p=0.003. In addition to parenting practices, 81.8% of parents improved in at least one nutrition or physical activity behavior. This aligns with other studies that have utilized *Healthy Children, Healthy Families: Parents Making a Difference!* (Lent et al., 2012).

The children also showed improvement in behaviors including vegetable, soda and low-fat milk consumption and amount of physical activity. Based on parent report of their child's behaviors, 76% of the children improved on at least one behavior. Based on the child self-report, there were no significant improvements in behavior, although at baseline the children were already meeting the recommendations of at least two fruits and two vegetables per day (with the assumption that times per day is equivalent to cups). However, like other hands-on cooking programs with children, the program did have an effect on the children's confidence of cooking skills from baseline to post assessment (Zahr & Sibeko, 2017). When the eight confidence variables were combined and averaged, there was a significant improvement in the children's overall confidence of cooking skills from baseline to post-assessment, M=0.28, 95% CI [0.08, 0.48], t(21)=2.91, p=0.008.

Parents were asked to provide anecdotes on how they thought the program influenced their family as a result of participating in the "Family Night" program. Table 1 provides written quotes from parents.

Successes of the program include being able to continuously evolve and innovate the recruitment methods. This included changing the format of the program to encourage participation and increase retention. As a result, for the parents that participated they were able to improve their positive parenting practices as well as parent and child nutrition-related behaviors. However, there were several challenges. Despite extensive efforts to recruit, the number of participants recruited into the program was small. Due to the small sample size, the study design was limited to non-experimental pre-post which may have limited the ability to detect significant changes. Lastly, it appeared that parents reported enjoying the program and making many behavior changes as a result. Unfortunately, this was not reflected in the survey data, indicating that the survey instrument may not have been sensitive enough to detect change or the sample size was too small.

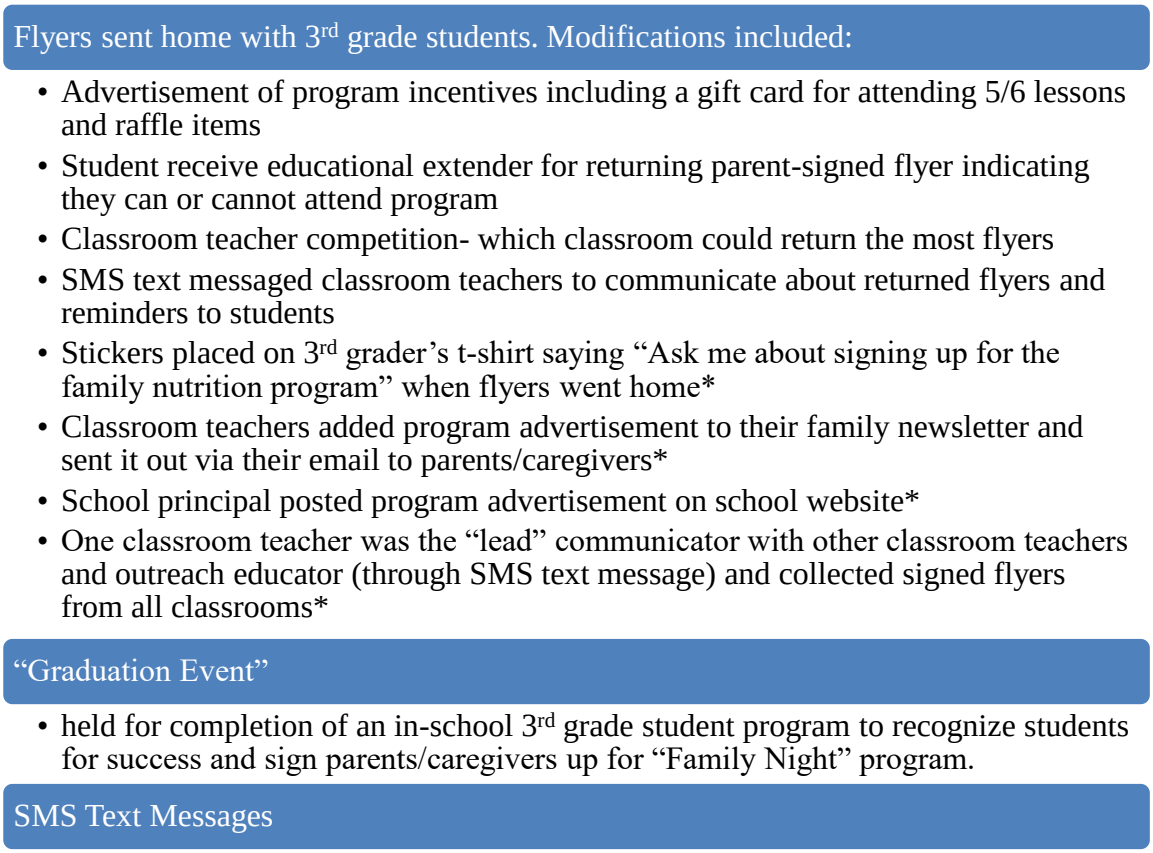
CONCLUSION AND IMPLICATIONS

In conclusion, community programs that involve families are needed to foster a healthy home environment by improving parenting practices and also to improve children's nutrition-related behaviors. It appears that including the entire family in addition to communication with them via text messages are possible strategies to increase recruitment and retention. Future outreach and extension efforts should

continue to explore novel ways to engage families, especially low-SES families that face increased barriers towards attending community outreach programs.

Chapter Three Figures and Tables

Figure 1: Recruitment Methods for "Family Night" program



*method used in data not presented in this article

Table 1: Parental Anecdotes in Regarding Family Changes Made Since Starting the "Family Night" Program

"I am eating many more fruits and vegetables as alternatives to fatty foods. I use to drink three cans of soda a day; now I have only one a week, if that. Definitely eating more fruit and vegetables. This program has opened my eyes!"
"My third grade son came home pushing me to take the class. So we are together on eating healthy food. We stopped juice too….my son and I are encouraging each other."
"Before this program my kids were in control of what they ate…but now I enjoy giving them and showing them different ways to eat. Instead of soda, we drink water, or [no added sugar] juice. It was pretty hard at first but we got the hang of it."
"Since the program started, my son has been more encouraged to spend time with the family cooking and eating together and even try to eat a select amount of different healthy food."

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EXTENDED LITERATURE REVIEW

This literature review will provide background and relevant research on racially and ethnically diverse, low socio-economic (SES) school-aged students. It will show the relationship of health to energy-dense snacks (EDS) and sugar-sweetened beverages (SSB). It will also describe the effect school-based nutrition education programs, specifically those involving technology or including family components, have on the student's EDS and SSB consumption. Lastly, it will provide background as to why students' perspectives and inputs are so valuable for a successful program.

Overview of body weight in children

Prevalence of obesity

Obesity among children in the United States continues to be an important public health problem. To assist in tracking the severity of obesity, the Centers for Disease Control (CDC) has provided more specific classifications of obesity based on Body Mass Index (BMI)-for-age charts. Class I obesity is defined as ≥95th percentile (hereinafter referred to as "obese"), class II obesity as ≥120% of the 95th percentile (hereinafter referred to as "extreme" obesity), and class III obesity as ≥140% of the 95th percentile.[1] According to the 2015-2016 National Health and Nutrition Examination Survey (NHANES), an average of 18.7% of school-aged children (ages 6-11 years) were obese, with 5.2% of those extremely obese.[1]

Why childhood obesity is a public health concern

Childhood obesity is a public health concern due to the consequences associated with an increase risk to several physiological and psychological diseases. and cost to the healthcare system. Childhood obesity is associated with increased physiological risks including cardiovascular disease, type II diabetes, hypertension, asthma and sleep apnea, joint problems, metabolic syndrome, and fatty liver disease.[2-6] Psychologically, obese children are at increased risk for anxiety and depression, low self-esteem, and social problems like bullying and stigma.[7-9] Compared to a normal weight 10-year old child who maintains a normal weight through adulthood, it is estimated that the incremental lifetime medical costs of an obese 10-year old child that remains obese as an adult is $19,000.[10] This is troubling as nearly one-fifth of school-aged children are obese.[1] Given the potential consequences of childhood obesity, it is important to understand the contributing factors that can inform interventions.

Determinants of childhood obesity

There are several factors that can affect weight including race, ethnicity and socio-economic status as well as biological, social and environmental determinants. Racial/ethnic minority children and adolescents have the highest prevalence of obesity, as 25.8% of Hispanic youth (2-19 year olds) are obese, with 9.1% extremely obese, compared to 14.1% obesity in non-Hispanic White youth (2.9% extreme obesity), followed by 22.2% obesity in non-Hispanic Black youth (9.0% extreme obesity).[1] While not synonymous, there is a relationship between minority race/ethnicity and SES. Ethnic minority populations have a greater propensity to live

in poverty, as evidenced by the 2014 United States census which found that 23.6% of Hispanics and 26.2% of the Black population lived in poverty, compared to only 12.7% of the White population.[11]

Independent to ethnic minority status, lower SES is also associated with higher obesity prevalence. When compared to higher-SES children of the same ethnicity and race, low-SES Hispanic, White, and Black children were 2.7, 1.9 and 3.2 times more likely to be obese, respectively.[12] Capturing a true measures of SES can be challenging; thus research often uses proxy measures such as parental education, parental occupation, family income, composite SES, and neighborhood SES.[13] A systematic review of cross-sectional studies from 1990-2005 found 10 out of 18 studies to have an inverse association between children's (ages 5-11) adiposity and any SES proxy measure, with 15 out of 20 studies having the same relationship when parental education status was the indicator of SES.[13] Thus, low SES captured through various measures shows an association with increased child adiposity.

Various biological, social and environmental determinants also affect weight. These determinants intertwine in children to lead to a greater propensity to be obese. Biological sex, lack of safe places to play, food deserts where there is limited access to healthy, affordable food,[14] and home environments that allow for unhealthy food items and poor parent modeling all influence the risk of childhood obesity.[15] Of the social and environmental determinants, dietary behaviors such as fruits and vegetables (FV), EDS and SSB are important.

Dietary habits that are associated with childhood obesity

Fruits and vegetables

Contributing to the obesity epidemic among children is insufficient consumption of FV.[16] There are several nutrients in FV including vitamins, minerals and fiber that contribute to a healthy diet.[17] These nutrients not only help maintain a healthy weight, but may decrease the risk of chronic diseases associated with obesity.[18] Both the U.S. Dietary Guidelines for Americans 2015-2020 and Healthy People 2020 encourage the consumption of FV;[16, 19] unfortunately school-aged children are not meeting the recommendation of 1.0-1.5 cups of fruit per day and 1.5 to 2.0 cups of vegetables per day.[20, 21] Instead, the U.S. population is consuming an average of 0.53 cup equivalents of fruits and 0.76 cup equivalents of vegetables per 1,000 calories.[16]

While children are not consuming the recommended amounts of FV nationally, there is a larger disparity in racial and ethnic minority and low-SES groups. The non-Hispanic Black population consumes less whole fruit (mean 0.53 servings) than the non-Hispanic White population (0.69 servings); additionally non-Hispanic Black (0.58 servings), Hispanic (0.56 servings), and Mexican-American (0.44 servings) populations all consume more fruit juice than the non-Hispanic White population (0.31 servings).[22] In regards to SES, there is an inverse association between SES and whole fruit consumption.[22] In fact, while 64.2% of high-SES 4-13 year-old children did not meet the recommendation of 1.5 servings of fruit in a day, 68.9% to 83.1% of lower-SES same-aged children did not meet the recommendation.[22]

The same trend follows for vegetable consumption, with the non-Hispanic Black population (all ages) consuming 0.5 few daily servings of vegetables than the non-Hispanic White population and the lower-SES population consuming 0.22-0.35 fewer daily servings than the higher-SES population.[23] These disparities may be due to types of foods prioritized when shopping. Access to FV can be an issue in low-SES neighborhoods. Many low-SES neighborhoods are considered food deserts, lacking healthy affordable food.[14] Qualitative research has found low-SES parents of school-aged children do not prioritize purchasing FV when on a limited budget because it is thought to be more expensive and less satiating than other food items.[24] These parents also found it frustrating that "junk food", such as EDS, was less expensive than FV.[24]

Energy-dense snacks

EDS contribute to the obesity epidemic not only because they may replace healthy FV options in a diet, but also because of their high energy density.[25] High energy-dense foods and drinks have a high amount of energy per gram of food.[26] Too much energy (in the form of kilocalories) can lead to weight gain.[27] Thus, snacks, including both salty and sweet foods, are a concern due to their energy density.[28] Based on 24-hour recalls of 1,562 10-year old children in Bogalusa, Louisiana, consumption of sweet foods such as desserts, candy and sweetened beverages as well as low-quality foods such as salty snacks, sweet foods, and beverages, had a significant positive association with being overweight.[29] This is troubling given that the 2007-2010 NHANES data found salty and sweet snacks were consumed by about 56.2% and 72.5% of children ages 6-11 years old, respectively.[30]

Sodium and added sugar are key components to EDS. While there is no recommended allowance for EDS, there are tolerable upper limits for sodium (1,900 milligrams [mg]/day for children ages 4-8 years) and limits to how much added sugar should contribute to total calories in a day (10% of total calories/day).[19, 31] However, 2009-2012 NHANES data found children ages 4-8 years had an average sodium consumption of 2,754mg/day, with 92.2% of this age group's consumption greater than or equal to 1,900mg/day.[32] Similarly, 2009-2012 NHANES data revealed that children 6-11 years old had a higher than recommended consumption for added sugar, with approximately 15% of their total calories (of which 8.8% are food products) coming from added sugar.[33] Given that salty and sweet snacks are energy dense and low in nutrients like vitamins, minerals and fiber, reducing them may not only help meet the recommended consumption levels of sodium and added sugar, but also help reduce the rates of obesity.

While the racial and ethnic minority and low-SES populations are under consuming FV compared to non-Hispanic White and higher-SES counterparts, they are overconsuming EDS. Dunford and Popkin assessed snacking trends of U.S. children (2-18 years old) from 1977 to 2014 (n=49,952).[34] Their results found that while snacks per day increased across all races, ethnicities and SES, the largest increase in calories (kcals) per capita of snacks was seen in the non-Hispanic Black and lowest-SES populations.[34] From 1977 to 2014, non-Hispanic Black population increased their per capita mean consumption from snacks from 138 kcals to 455 kcals. This is a 317 kcal increase compared to 248 kcals for Mexican-American and 148 kcals for the non-Hispanic White populations. There was an inverse association

between SES and per capital mean consumption of snack increase. Those below the 185% National Poverty Level (NPL) increased their per capita mean consumption of snacks from 1977 to 2013 by 234 kcals, compared to 171 kcals for those in the 185% to 350% of the NPL and 134 kcals for those over 350% NPL.[34]

Reasons for the disparities in EDS consumption among minority populations include environmental factors such as targeted food marketing and parental reasons for purchasing. Advertisers target certain products to certain demographics, with unhealthy items more heavily targeted in low-SES and proportionally higher Black children areas.[35] Additionally, reasons why parents provide snacks may be aiding in the difference between populations of EDS consumption. Parents (70.9% Supplemental Nutrition Assistance Program recipients) of 2-12 year-old children who had a high school diploma or less were more likely to give snacks for non-nutritive reasons (i.e. keeping a child quiet or celebrating an event) and less for nutritive reasons (i.e. promote growth or satisfy hunger) than those with a college education.[36] Children who received snacks for non-nutritive reasons were significantly less likely to adhere to dietary recommendations.[36]

Sugar-sweetened beverages

Like EDS, SSB, which include flavored juice drinks, sports drinks, energy drinks and soft drinks, have a positive association with excess weight gain, likely because of the high sugar content that contributes to high calorie consumption.[29, 37-40] In the same study mentioned previously, the Bogalusa cross-sectional study with 10-year old youths (n=1,562) found the consumption of SSB was associated with an

increased chance (OR 1.33, 1.12-1.57, p<0.001) of being overweight.[29] Although several studies that show an association between SSB and weight are cross-sectional in nature and causality cannot be inferred, a systematic review found that among four of six prospective cohort studies and two experimental studies, there was a strong association between SSB and weight gain.[29, 30, 38, 41]

While the adjusted prevalence of total SSB consumption has actually decreased over the last several decades from 78% to 66% in children (n=8,627; ages 2-11 years old) from 1999-2000 to 2007-2008, this rate is still high.[41] Recommendations are to limit added sugar to no more than 10% of total calories in a day.[19] Yet, of the 2009-2012 NHANES data that showed 15% of total calories provided by added sugar for 6-11 year olds, 6.2% of those total calories are from non-dairy beverages.[33] Compared to White children, Black children had a significantly higher odds of consuming SSB (OR=1.30).[41] Similarly, low-SES children also had a significantly higher odds of consuming SSB (OR=1.18) compared to high-SES children.[41] Certain types of SSB are more prevalent with various groups. Black children have significantly higher odds (OR=2.31) of consuming fruit drinks when compared to White children and low-SES children have significantly higher odds (OR=1.29) of consuming regular soda compared to high-SES children.[41]

In the New Jersey Childhood Obesity Study, Taseveska et al. aimed to find factors predictive of high SSB consumption in low-SES, racially and ethnically diverse children.[42] A total of 1,403 children living in low-SES cities (ages 3-18 years) were surveyed. There were significantly higher consumption of SSB in non-Hispanic Black children compared to non-Hispanic White children, an inverse association

between SSB consumption and parental education attainment, and a positive correlations between child SSB consumption and parental SSB consumption and child fast food consumption.[42] Thus, a combination of social and environmental factors may be predictive of SSB consumption.

Overconsumption of SSB, along with EDS, may be contributing to the obesity epidemic in children because of its high energy density and potential replacement of healthy foods like FV. This is particularly concerning with racial and ethnic minority or low-SES children whose diets are often less healthy than White or higher-SES populations. Several factors may contribute to low FV consumption and high EDS and SSB consumption in ethnically and racially diverse, low-SES populations. Such factors include environment[14] and exposure to unhealthy advertisement.[35] Many of these factors can be diminished with nutrition education programs that teach how to shop and eat healthy on a limited budget and focus on behavior change for children and their families. Given their wide reach, schools are an optimal location to educate on the importance of healthy foods and/or reduction of unhealthy foods that may influence dietary habits.[43]

School-based nutrition education program in low-SES minority population

Theoretical frameworks

Schools are an ideal place to provide nutrition education to students as they are a captive audience. How much the student retains and puts into practice can depend on several curriculum factors. Behavior theories can help inform successful curriculums for health promotion programs.[44] The most common theories utilized in nutrition

education programs include the Social Cognitive Theory (SCT)[45] and the Experiential Learning Theory (ELT).[46] The premise behind Albert Bandura's SCT is reciprocal determinism, that is, learning and maintenance of a behavior happens in a social context where people learn through interaction, response to behaviors, and observation with others and their environment.[45] Aside from reciprocal determinism, other key constructs include observational learning, reinforcement, expectations, and self-efficacy.[44] The emphasis with David Kolb's ELT is the process of learning, where learning occurs and modifies with different experiences.[46] There are four stages: concrete experience, reflective observation, abstract conceptualization and active experimentation.[46] Thus, by providing students the opportunity to actively engage in a topic and make it applicable to themselves, their chances of learning, and subsequently, behavior change, increases.

FV consumption is often the focus of nutrition education efforts with school-aged students,[47, 48] with few concentrating on low-SES minority populations.[49-55] The development of obesity is complex with a number of environmental and individual contributors. Multi-level interventions have been successful in changing student behaviors.[56] This study specifically targets contribution of EDS, SSB and SES and may help inform effective obesity prevention focus areas. Thus the following is a thorough literature review of school-based nutrition education programs with low-SES students that focus on EDS and SSB.

Energy-dense snack focus in school-based nutrition education programs

There are very few school-based nutrition education programs that focus on energy-dense snacks with school-aged, low-SES students. In Lebanon, 9-11 year old students (n=188) from public (generally low-SES) and private (generally middle or high-SES) schools participated in a 12 lesson intervention.[57] Over this 3-month period, students received interactive, hands-on lessons in the classroom once per week; families were invited to meetings and health fairs and students brought home information and recipes; and a food service component focused on what was sold in the school store and what students brought in from home for lunch. Based on student-completed habit questionnaires, there were several significant improvements in the intervention group. Compared to the control group, the intervention group was successful at reducing the odds of consuming chips as snacks (OR= 0.14; 95% CI= 0.11, 0.19, $p<0.05$) and drinking soft drinks (OR= 0.31; 95% CI= 0.19, 0.52, $p<0.05$) as well as purchasing chips (OR= 0.16; 95% CI= 0.04, 0.61, $p<0.05$), soft drinks (OR= 0.12; 95% CI= 0.04, 0.29, $p<0.05$) and chocolate (OR= 0.29; 95% CI= 0.12, 0.66, $p<0.05$).[57] Given the multi-level approach of this curriculum, it is unclear if the student nutrition education classroom curriculum alone caused the improvements in behaviors.

Rosário et al focused on classroom education as the sole component to elicit behavior change.[58] This cluster (by school) randomized trial involved 464 students 6-12 years old from seven Portuguese schools. Classroom teachers taught the 12-lesson curriculum. Baseline data was collected in the 2007/2008 school year and post-intervention data in 2009. From baseline to post-intervention, the treatment group

decreased their energy-dense food consumption from 83.8 grams (g) to 82.9g, while the control group increased consumption from 92.3g to 116.8g when adjusting for mean for school, gender, age, and baseline energy consumption, parent's education, weight status, physical activity index and baseline measures of the dependent variable.[58] These differences resulted in a significant (p=0.031) impact on energy-dense foods from the intervention. This time by group interaction effect may be more due to the control group increasing their consumption than the small decrease that the treatment group made. In addition, the consumption data was based on single 24-hour recalls at baseline and post-intervention conducted with the students. This single data point may or may not reflect usual dietary consumption of energy-dense foods. This study found no significant change in SSB consumption. However, several studies have found significant improvements in SSB consumption through nutrition education programs.

Sugar-sweetened beverage focus in school-based nutrition education programs

SSB continue to be a focus as the cause of unhealthy weight, thus there are several systematic reviews exploring to what effect nutrition education has on SSB consumption in students. A meta-analysis with 23 community and school-based studies involving 10,964 school-aged students found a medium-sized effect in the decrease in SSB in intervention groups by 76 milliliters (mL) per day (95% CI= -105, -46, $p<0.01$).[59] When only looking at school-based studies, there was a -28mL per day (95% CI= -42, -12, $p<0.01$) decrease in SSB consumption.[59] This systematic review included randomized controlled trials (RCTs), cluster RCTs, and non-RCTs with a

control group that were at least 4 weeks long. Rahman et al focused their systematic review on only RCT studies.[60] Sixteen (16) studies were involved, and of those, 14 were school based and two could be pooled for meta-analysis. The two studies (n=3,877 students) pooled together resulted in a borderline, but non-significant, improvement in SSB consumption (MD= -26.53mL; 95% CI= -53.72, 0.66; p=0.06).[60] Lastly, Avery et al conducted a systematic review that specifically looked at studies that involved greater than or equal to 100 students, had control data, the intervention was at least 6 months long, and the results examined SSB consumption and body fatness change.[61] Eight studies were included in the systematic review, with seven being school-based. Six out of seven school-based interventions had significant ($p<0.05$) improvements in SSB consumption (though not always sustained).[61] While systematic reviews found positive effects of nutrition education on SSB consumption in students, examining specific studies provides more details to what programs included and how data was collected.

In New York, the Expanded Food and Nutrition Education Program (EFNEP) and Supplemental Nutrition Assistance Program- Education (SNAP-Ed) provided a 6-lesson curriculum, *Choose Health: Food, Fun, and Fitness (CHFFF)*, to 3rd-5th graders (n=5,636).[62] Each lesson was 45-60 minutes and included hands-on, interactive activities that focused on healthy eating and activity. From baseline to post-assessment, there was a significant ($p<0.001$) mean change decrease of -0.5 on a Likert scale assessing how often sweet drinks such as soda, fruit-flavored drinks, and sports drinks were consumed (n=680). With a more specific SSB-related questionnaire that separated out fruit drinks and sweetened iced teas from other SSB, a different sub-

sample of students (n=954) had a significant ($p<0.001$) decrease in how often fruit-flavored drinks, sweetened iced teas, and soda/pop were consumed.[62] One limit to the study includes the data collection instrument as the reliability testing of practice-based instruments was restricted to internal reliability and not test-retest. Another limit was the study design, so while significant decreases on the frequency Likert scale were found, since there was no control group in the study, the assumption cannot be made that the intervention caused the behavior change.

Sichieri et al did use a control-group study design to assess the 7-month intervention on 1,140 4th graders (9-12 years old) in 22 schools in Brazil.[63] The 10, 1-hour lessons were 20-30 minutes each and focused on water consumption instead of carbonated SSB. One 24-hour recall at baseline and post-intervention assessed beverage consumption. There was a statistical significant mean change in daily consumption of carbonated SSB in the treatment group (M= -69.0mL/day; 95% CI= -114.0, -24.0) versus the control group (M= -13.0mL/day; 95% CI= -56.0, 31.0) from baseline to post-assessment.[63] However, while carbonated SSB decreased in the treatment group, there was an upward trend in juice consumption. In addition, the study focused on water consumption, yet did not measure its consumption at either time point.

Similar to Sichieri, Van de Gaar aimed to decrease SSB consumption by implementing an intervention focused on water consumption.[64] This 1-year intervention included school-based and community-based participation in the Netherlands. Students ages 6-12 years (n=1,009) in four schools (two treatment and two control) and their parents participated in the intervention. At school, students

received an unspecified number of lesson games and activities at school and were exposed to policy, systems and environmental (PSE) changes such as having water breaks during physical education class and offered water to drink in the day. In the community, the students were provided water bottles and parents were offered water-related lessons and activities. There were three modes of data collection: observation of student beverage consumption one morning at school, student recall of average beverage consumption, and a parent report to determine if their child consumed SSB daily. Based on the observation and parent reports, there was a positive intervention effect on SSB consumption. The trained observers saw a significant decrease in how many SSB were brought to school (OR= 0.51, 95% CI= 0.36, 0.72, $p<0.001$) compared to the control group.[64] The parents reported a significant decrease in average SSB consumption (β= -0.19 liters, 95% CI= -0.28, -0.10, $p<0.001$) and servings (β= -0.54 servings, 95% CI= -0.82, -0.26, $p<0.001$) compared to the control group.[64] Like Sichieri, a limit to this study is the lack of data collection on water consumption. In addition, while SSB drinks included soda and energy drinks, it also included fruit juice and flavored milk, sugar-containing drinks that do provide some nutrition. Since there were also several components to the intervention, the PSE or community aspects may have contributed to the decrease in SSB consumption. Lastly, the self-reported student data did not have any significant results. Self-reporting by school-aged students can be a challenge as they may over report, under report, or omit items.[65]

To alleviate problems with student self-reporting SSB consumption, Feng et al asked parents to complete a survey of their student's typical weekday and weekend SSB consumption in their longitudinal, quasi-experimental intervention.[66] Five-

hundred and fifty-five (555) predominately Hispanic (88%) low-SES students in five schools in West Texas (ages 5-9 years) participated in the 18 month intervention. The intervention included 10 1-hour lessons provided on a weekly basis along with a take-home workbook and integration of a Junior Masters Gardeners curriculum. The nutrition education intervention was taught by trained instructors in the first year and classroom teachers in the second year. In addition, parents received monthly newsletters, family fun nights were held twice a year, and a home visitation program was offered to parents of students whose body mass index was $\geq 85^{th}$ percentile for age and gender. Data was collected at baseline, and 4, 10, 16 and 22 months. From baseline to post-assessment at 22 months, there was a linear increase in SSB consumption by both the treatment group ($\beta = -0.29 \pm 0.12$ ounces per month, $p<0.05$) and control group ($\beta = 1.06 \pm 0.40$ ounces per month, $p<0.01$), although these results show that the intervention did slow down the rate of SSB consumption.[66] At 22 months, the treatment group (M=22.50 ounces; SD= 17.16) consumed significantly ($p<0.05$) less SSB than the control group (M=27.11 ounces; SD=20.57). In addition, the study found that daily TV time, fast food consumption, and types of SSB available at home were significantly ($p<0.001$) positively associated with predicting student's daily SSB consumption while family meals had an inverse ($p<0.01$) association.[66] One potential limit to this study is the inability to determine if the school-based education had an effect on SSB consumption or if the home visits (~40% of eligible families participated in this part of the project) contributed. Another limit is that while the parents may have more accurate recall of what their student consumed in the previous

day, the parent is not with them throughout the day, so SSB consumption during time apart may be inaccurate.

The effectiveness of school-based nutrition education research on EDS and SSB consumption in low-SES school-aged students remains inconclusive, with SSB being more extensively studied. However, both unhealthy dietary habits warrant further investigation as results have been modest and often involve several intervention components that go beyond direct nutrition education with the student. Additional strategies that more closely involve the students in school-based nutrition education may increase effectiveness of interventions.

Additional strategies to influence dietary behavior change

Use of technology in nutrition education programs focused on EDS and SSB

Technology is integrated into students' lives at school and at home. While too much non-productive screen time is discouraged, there is value in productive screen time.[67] Students respond favorably to technology, a tool that has been shown to increase nutrition outcomes.[68, 69] Two systematic reviews have focused on technology. One systematic review focused on technology-based interventions that either targeted prevention or treatment of overweight and obesity in youth.[70] Of the 24 studies included in the systematic review, four involved school-aged students. Three focused on prevention of overweight and obesity by concentrating on fruit, vegetable, juice or physical activity. Two of the three studies found positive behavior changes due to the study; however, one had no control group to compare an interaction effect.[70] The second systematic review of technology involved media-based health interventions

targeting behavior change in youth (not necessarily low-SES).[71] Like the other review, it found some significant improvements in the four studies that assessed dietary behaviors.[71] However, as noted in the review, interventions involving technology require more thorough and complete evaluation.

The research by Turnin et al[72] was one of the studies involved in the above-mentioned systematic review.[71] In France, 1, 876 students (grades 3-5) participated in a research study to assess the effect of games on nutrition knowledge and behavior.[72] Over a 5-week period, the treatment group (n=1,003 students; 8 schools) received the 1-hour, twice a week nutrition education intervention through games while the control group (n=873 students; 7 schools) received the nutrition education through a teacher. Based on questionnaires and a 3-day food record completed at post-assessment only, the treatment group (M=48.8 points, SD= 0.4) scored significantly ($p<0.001$) higher on the knowledge test than the control group (M=46.1 points; SD=0.4) (range of 0-80 points) and also consumed significantly less delicatessen food ($p<0.01$), sweetened dairy dessert ($p<0.0001$) and less fat ($p<0.0001$).[72] While this data should be approached with caution as there was no baseline assessment, it may suggest that technology helps increase knowledge and nutrition-related behaviors in students.

Ezendam et al conducted a cluster randomized controlled trial *FATaintPHAT* with 20 schools in the Netherlands (n=883 students).[73] The students, ages 12-13 years old, in the treatment group participated in the 8-module web-based intervention over a 10-week period. The intervention aimed to prevent excessive weight gain by improving dietary habits of the youth. Data was collected at baseline, post-intervention (4 months from baseline) and at a 2-year follow-up. At 4 months, 64.3% of treatment

group versus 75.6% of the control group reported drinking greater than 400mL of SSB per day. In addition, the treatment students decreased their snack pieces per day from 5.5±3.8 pieces at baseline to 4.9±3.8 pieces at 4 months compared to the control group who increased their snack pieces per day from 5.2±3.3 pieces to 5.5±4.1 pieces.[73] These results were not sustained over the 2-year period. In regards to SSB, a limit to the reported data is only providing results of greater than or less than 400mL, not a smaller quantity. Smaller quantities may still be impactful in SSB consumption change.

Servings per day of SSB and FV, as well as screen time, were the focus of a 12-week mobile technology pilot RCT intervention with 9-14 year-old females (83.7% African American; 32.4% living in poverty) in Kansas.[74] The treatment group (n=26) received the technology that included setting goals for behavior change, self-monitoring, and feedback and reinforcement on goal attainment. The control group (n=25) received manuals that contained screen shots from the electronic, treatment version of the intervention, and the control students had to initiate their own goal setting and self-monitoring, while receiving no feedback or reinforcement. One week day and one weekend day recall via 24-hour multiple pass method was used at baseline and week 8 for SSB with the female participants. While there was a decrease in SSB servings per day from baseline (M=1.20 serving/day; SD=0.92) to week 8 (M= 0.87 servings/day; SD= 0.93), it was not significant and the effect size was small/medium (d= -0.34). There was a significant association (r= 0.50, p=0.01) between the technology use and SSB consumption, with those girls who responded to more prompts had a greater reduction in SSB at week 8 compared to those who

responded to fewer than six prompts.[74] As this was a pilot, the sample size was small. In addition, it was with a specific population and thus cannot be generalized to males or other races/ethnicities.

Quest to Lava Mountain included racially and ethnically diverse males and females.[52] The computer-based education game intended to improve dietary behaviors, physical activity behaviors and psychosocial factors in racially and ethnically diverse (48.6% Hispanic; 10.5% African-American/Black) 9-11 year old males (57.1%) and females in Texas.[52] This quasi-experimental cluster (by school) RCT involved six schools (n=107 students) that ranged from 20% to 85% free/reduced meals. The 10-hour game administered by school staff. The intention was to play for a minimum of 90 minutes per week for 6-weeks. Dietary behavior was assessed with baseline and post-assessment 24-hour dietary recalls (two weekdays at each time point). The treatment group (n=53) significantly decreased their sugar consumption (MD= -4.9g/1,000 kcals) compared to the control group (n=54) (MD= 5.61g/1,000 kcals) from baseline to post-assessment (β= -9.73; 95% CI= -18.00, =1.47, p=0.021).[52] One limitation to this study included dietary recall on only weekdays, thus not accounting for weekend consumption habits. Additionally, there was a higher attrition rate in the treatment (17%) versus the control (7%) group, and treatment students did not receive the recommended dose of 90 minutes per week of education.

While school staff do their best to ensure accurate dosage of a program, research staff often implement the program themselves. This was the case with the U. of Alabama's school-based nutrition education curriculum *Body Quest: Food of the Warrior* (BQ).[54] This study used iPad application technology with low-SES school-

aged students to impact changes in FV consumption[54] and later in an additional study, intent to change SSB consumption.[75] The original quasi-experimental, cluster-designed study by Struempler and colleagues assessed the effect of a 13-week technology-integrated nutrition education program on the FV consumption of 2,4777 3rd grade students in 60 SNAP-eligible schools (i.e. ≥50% eligible for free/reduced meals).[54] Results showed a significant ($p<0.001$) increase in FV consumption during school lunch (the focus of assessment). The next school year, an additional cluster-designed study was conducted with 3,568 3rd graders from 80 SNAP-eligible schools[75]. In addition to the assessment of FV consumed during lunch, this study assessed knowledge, intention, and behavior of dietary and physical activity characteristics at weeks 1, 7, 12, and 17. In regards to beverages, the question "will you drink water instead of soda in the future?" was asked. At baseline there was no significant difference between groups in their response of "yes"; however, at post-assessment, the treatment group (76.7%) responded "yes" significantly ($p<0.001$) more than the control group (64.0%).[75] However, a major limitation to the data collected was that it only assessed intent to change SSB consumption, not actual change in consumption.

Overall, technology-integrated school-based nutrition education programs involving low-SES school-aged students have shown positive results in EDS or SSB-related changes. However, the studies have had limitations including no comparison groups, not meeting dose recommendations, not generalizable, and lack specific EDS and SSB consumption changes. Therefore, there is a need to assess the effect of a technology-integrated, school-based nutrition education program on EDS and SSB

consumption of low-SES school-aged students through a two-group by two-time point study design.

Parent involvement in student's EDS and SSB consumption

In addition to technology, parent involvement may increase nutrition outcomes of children, as was shown by the above-mentioned Feng et al study.[66] Parenting practices are parent behaviors or actions towards their child that influence the child's attitudes, behaviors or beliefs.[76] These actions may be intentional or unintentional by the parent and include coercive control, structure and autonomy support.[76]

Coercive control includes restriction of foods, pressure to eat, and threats or bribes.[76] Restriction of foods can negatively affect unhealthy food consumption. In a systematic review and meta-analysis, 5 out of 11 studies suggested that this parenting practice was associated with higher consumption of unhealthy foods by children ages 7-11 years old, 1 out of 11 studies found a decreased consumption, and 5 out of the 11 studies had non-significant findings.[77] When the parental practices were synthesized in a meta-analysis, pressure to eat (n= 9 studies; r= 0.04, 95% CI= 0.00, 0.08) and food as reward (n=4 studies; r= 0.14, 95% CI= 0.03, 0.25) were positively associated ($p<0.05$) with unhealthy food consumption.[77]

Structure includes setting rules and limits with meal and snack schedules, modeling by parents of nutrition-related behaviors, food accessibility/availability in the home, and neglect or indulgence by the parent.[76] A cross-sectional study found such parenting practices to be associated with SSB consumption (specifically fruit drink/juice and soft drink) by children.[78] Children, ages 10-12 years, and their families

across eight countries in Europe were involved (n=7,915 students; 6,512 parents). Positive associations ($p<0.05$) were found between student SSB consumption and parent modeling, availability of SSB in the home, and consuming SSB with the parents. Permissiveness (allowing SSB), lack of monitoring, and low self-efficacy by the parent were associated ($p<0.05$) with increased soft drink consumption by children.[78]

Autonomy support includes nutrition education by the parent, student involvement in meal preparation, encouragement, praise, reasoning and negotiation.[76] A cross-sectional study out of Canada found that with increased involvement by 5th graders (n=3,398) in meal preparation, there was an increase in FV preference.[79] Rewarding with verbal praise has been associated ($p<0,05$) with a decrease in unhealthy food consumption, particularly in younger children (n=4 studies; r= -0.04, 95% CI= -0.07, -0.01).[77] Various parenting practices can have a positive or negative effect on what a child consumes.

Some studies have specifically explored the association between low-SES or racially and ethnically diverse backgrounds, parenting practices, and children's unhealthy food habits. A Dutch longitudinal study involved children 8-12 years old and their parents (n=1,318 child-parent dyads) to explore SES as it relates to parenting practices and unhealthy food habits.[80] The study used maternal education level as an indicator for SES. It found that, based on food frequency questionnaires over a week period, intermediate-SES children (i.e. mother obtained intermediate vocational level, higher secondary school or pre-university education) consumed the highest amount of snacks per week (10.2 items/week) while high-SES children (i.e. mother obtained

higher vocational or university education) consumed the lowest (9.0 items/week). This was statistically significant between the two groups (β= 1.22, 95% CI= 0.22, 2.20, p=0.02). Although not significant, the odds ratio of low-SES children having snacks at home was 1.16, whereas for high-SES children it was 1.00.[80] The highest SSB consumption was seen in the low-SES group of children (2.4 liters/week) while the high-SES children consumed the least (1.8 liters/week). This was statistically significant between the two groups (β= 0.63, 95% CI= 0.36, 0.91, $p<0.05$). In addition, there were significant associations ($p<0.05$) between parental consumption (modeling) and home availability of SSB and children's SSB consumption. Children consumed 0.46 liters more of SSB per week if their parent consumed 1-liter of SSB per week. Additionally, if there were always SSB available in the home, the child consumed 0.96 liters more per week.[80]

Harris and Ramsey examined the association between African-American father's parenting practices and their child's SSB consumption.[81] The fathers (n=102) had children between the ages of 3-13 years old and completed usual consumption surveys for both themselves and their child. There were significant correlations between father's consumption of SSB and their child's SSB consumption (r=0.67; $p<0.001$), modeling (r= -0.21; $p<0.05$), and household availability (r= -0.36; $p<0.001$).[81] However, it is important to note this study did not compare outcomes of the African-American families to other races and ethnicities. Overall, parents can shape a child's eating behavior by their control over food, modeling of behaviors, child involvement with food, and availability and accessibility of foods in the home.

The Academy of Nutrition and Dietetics recommends a multicomponent intervention, including an interactive at-home parental component, to have the greatest impact on prevention.[82] Similarly, a systematic review on efforts to reduce childhood obesity found the most effective methods included both school- and parent-based aspects.[83] The combination of technology-integrated nutrition education and parent-inclusive research is scarce. To date, these studies have mostly focused on FV outcomes,[49-51, 53-55] with one study to the researcher's knowledge that has included EDS or SSB in their research.[75] Parent involvement in the interventions have varied from newsletters sent home with the students[49, 54, 55, 75] to nutrition education classes for the parents themselves.[50, 51, 53] More parent-inclusive and parent-involved nutrition education programs that focus on an outcome of student's EDS and SSB consumption are needed.

Improvements to Nutrition Education Programs

While nutrition education programs have shown effectiveness in behavior change, there is always room for improvement. One way to improve these programs is by incorporating student feedback into nutrition education programs. Research has found that qualitative research conducted with students provides meaningful information to improve programming.[84] The *Health-E-PALS* pilot study in Lebanon conducted focus groups with students after a multicomponent, school-based intervention.[57] The goal of the focus groups was to determine the perception of the program, potential improvements to the program and also what the students perceived that they learned. The students found the interactive, fun activities most beneficial to

their learning and behavior change, but wish the program was longer in duration.[57] Similarly, Grassi et al explored students' perspectives following a 10-week intervention in Italy.[85] The focus groups provided more insight to responses also obtained quantitatively, information on positive and negative reinforcements to behavior change, and explored the student's satisfaction with the program.[85] The information gained by focus groups can help refine curriculum content for more successful programs.

While the above focus groups aimed to improve programming, focus groups can also set out to provide formative information to create programming. Boddy et al aimed to learn what factors influence student's behaviors, both positively and negatively, as formative research to develop the *CHANGE!* school-based curriculum intervention.[86] Their qualitative analysis found the largest influence on student's nutritional habits were parents and their parenting practices, such as role modeling or rule setting, as well as siblings and grandparents. Barriers to healthy eating not only included parenting practices such as food as reward, but also preferred taste and smell of unhealthy foods, advertisement and convenience.[86] Knowing these influences and barriers to healthy eating can help mold an effective program.

The students' perspectives may help provide a more complete picture on how a school-based nutrition education program can impact what they eat. Students' perspectives may also provide insight to help guide future programming. However, few studies have incorporated feedback from low-SES, racially and ethnically diverse school-aged students. As this population is vulnerable to an increased risk for obesity,

it is important to determine how to best intervene, from their perspective, to promote healthy eating habits.

Conclusion and gaps

As obesity continues to be an important public concern, the eating habits of school-aged students are imperative for their current and future health. The low-SES and racially and ethnically diverse populations are especially susceptible to unhealthy habits. Schools provide an optimal location for nutrition education as students are a captive audience. While much school-based nutrition education research has involved low-SES, racially and ethnically diverse school-aged students, the majority have focused on FV consumption. While FV consumption is important to health, EDS and SSB consumption are also influential. The integration of technology into a school-based nutrition education program can improve dietary outcomes. However, research studies examining the effect of a technology-integrated school-based nutrition education program on the EDS and SSB consumption of low-SES-, racially and ethnically diverse students are lacking. Additionally, as parents influence student nutrition behavior, inclusion of parents in EDS- and SSB-focused nutrition education programs is warranted. Lastly, low-SES, racially and ethnically diverse students are rarely asked for feedback regarding nutrition education programs. Therefore, to strengthen current programs for this vulnerable population, inclusion of student's perspectives and input via focus groups is needed.

EXTENDED METHODS

Design

Three intervention components comprised this clustered-controlled trial conducted through a 5-year United States Department of Agriculture (USDA) Children, Youth and Families at Risk (CYFAR) grant awarded to the University of Rhode Island's (URI) Providence Community Nutrition office. The intervention components included 1) a 13-week school-based nutrition education program focused on decreasing 3rd graders' consumption of energy-dense snacks (EDS) and sugar-sweetened beverages (SSB), 2) a 6-week after school nutrition education program for 3rd graders that focused on cooking to increase consumption of healthy foods like fruits and vegetables (FV) (conducted as a part of a "Family Night" series), and 3) a 6-week positive parenting practice program for parents/caregivers of 3rd graders (conducted as a part of a "Family Night" series). Year 1 of the grant was a planning and pilot year. This dissertation includes data from years 2, 3, and 4, of which there were three intervention schools (10 3rd grade classrooms) and three control schools (11 3rd grade classrooms) involved. Year 5 is currently underway.

Through a 2x3 quasi-experimental design, the primary hypothesis of this research was that a 13-week school-based nutrition education program that used the technology-integrated *Body Quest: Food of the Warrior* (BQ) curriculum enhanced with additional nutrition education materials would result in a decrease in EDS (salty and sweet) and SSB consumption among low-income 3rd grade students. Over the course of the three data collection years, there were one treatment and one control

school each year (see "Study Timeline" below). Data collection occurred at baseline (week 1), post-assessment (week 13) and follow-up (week 27).

For the secondary aim, qualitative data was collected via semi-structured focus groups with treatment group 3rd graders. It was expected that the 3rd grade students would have a positive experience with the 13-week school-based nutrition education program and make dietary behavior changes as a result of the program. In addition, it was predicted that students would report on several barriers to becoming and staying healthy such as lack or overabundance of foods and taste preferences. Focus groups were conducted before the final follow-up data collection with treatment groups in years 2 and 3.

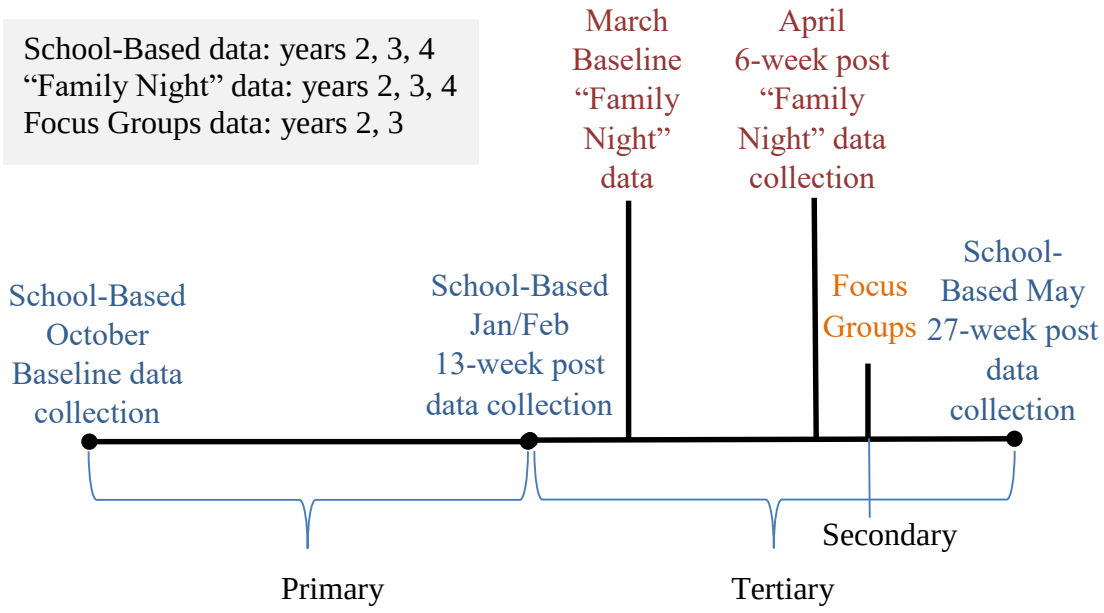
The tertiary, exploratory aim, hypothesized that students who were exposed to an additional 6-week "Family Night" program would have a larger decrease in EDS and SSB consumption when compared to students who only receive the 13-week school-based nutrition education program. This "Family Night" program occurred in between the post-assessment (week 13) and follow-up (week 27) data collection. Therefore, for this 2x2 design, post-assessment and follow-up data collected from 3rd graders in the treatment schools were used in analysis.

The University of Rhode Island's ethics committee granted internal review board approval for this research study (IRB#HU1415-015).

Study Timeline

Year	Date	Treatment Group	Control Group
1	2013-2014 (Planning and pilot)	n/a	n/a
2	2014-2015 (Data collection)	A	B
3	2015-2016 (Data collection)	B	C
4	2016-2017 (Data collection)	C	D
5	2017-2018 (Currently ongoing)	D	E

School-Based data: years 2, 3, 4
"Family Night" data: years 2, 3, 4
Focus Groups data: years 2, 3



Recruitment and Participants

Providence, RI is one of the four core cities in the state, with an average 87.7% of public school students eligible for free or reduced-school meals[87] and 64% being Hispanic/Latino and 17% Black/African-American.[88] Based on which elementary schools were Full Service Community Schools (schools that integrate community

programming for additional family services) as well as principal and 3rd grade teachers consent, the school district determined the initial treatment and control schools. In the next school year, the previous control school became the treatment school and, as Full Service Community Schools dissolved early in the grant, stakeholder referrals were used to select the subsequent schools.

For the primary aim, an initial meeting was held at the start of each school year with the principal and 3rd grade classroom teachers of the participating treatment and control schools. This meeting provided the opportunity for the researcher to describe the program and what it entailed and for the school staff to ask questions and share any concerns. Interested 3rd grade classroom teachers participated in the program. Parents and caregivers received a letter at home (Appendix A) describing the study and 3rd grade students in participating classrooms partook as a part of their science curriculum as approved by the URI IRB #1213-106. Third graders in the treatment schools received the 13-week school-based program while 3rd graders in the control schools received no programming. Over the three years of data collection, there were 10 treatment classrooms (217 students) and 11 control classrooms (242 students) involved.

The secondary aim involved 3rd graders from year 2 and year 3 treatment schools only. The classroom teachers were asked to select students of both genders, all learning levels, and who had attended the nutrition program throughout the school year. Sixteen semi-structured focus groups with four 3rd grade students in each group were completed.[89] Sixty-four out of a possible 138 students who received the program

were willing to participate and were selected by the classroom teacher. Thematic saturation was reached after 16 focus groups in two schools were conducted.

Lastly, for the tertiary aim, the treatment school 3rd graders who were involved in the "Family Night" programming were compared to treatment school 3rd grader who only received the 13-week school-based program. Initially, the "Family Night" series program was just a parent/caregiver program (as the 3rd grade students received the 13-week school-based program during the school day and an after school program if they participated in after school activities at the school). Recruitment occurred through collaboration with a previously-established community group program in the school. As there were very few parents/caregivers of 3rd graders involved in the community group program in the school, new groups were formed through cold calls to parents/caregivers (Appendix B), advertisements and sign-up sheets during school events (Appendix C), and talking to parents/caregivers during school drop-off and pick-up times. These newly formed groups had poor attendance. As the parent/caregiver-only program was unsuccessful and parents/caregivers often brought their children with them, the program format changed. With children being interested in coming to the program, and realizing that students enjoyed the school-based and after school programs, the parent/caregiver program was converted into a "Family Night" series program. Thus, even if the parents/caregivers were not totally interested in the program, their children were, and the families would attend.

Over the three years of programming, several recruitment methods were employed in an effort to enroll a maximum number of families into the "Family Night" series. One recruitment method included flyers sent home with the students

describing the program (Appendix D). These flyers were modified each year to increase recruitment. One modification included asking parent/caregivers to sign the flyer regardless as to if the family were planning to participate in the "Family Night" series (Appendix E); this ensured that the parent/caregiver read the flyer. Another was offering a nutrition education reinforcement item to the student for bringing back the signed flyer.

Another recruitment method was holding a "Graduation Event" for completion of the 13-week school-based program. This recognized the students for successful completion of the program and also provide the opportunity for parents/caregivers to discuss and sign up for the "Family Night" series. Lastly, SMS text messages were sent to parents/caregivers who signed up to remind them of the start date and time of the program. Over three years of data collection, 25 3rd graders and their families from treatment schools participated in the "Family Night" programming, while the remaining 192 students from treatment schools did not participate.

Instruments and Protocol for Data Collection

Instruments

The primary and tertiary aims used a student survey that relied on self-recall of previous day's consumption. Cognitive interviews were held with six 3rd grade students for understanding and clarity of the student survey instrument. Students were chosen by the classroom teacher at random. Students did not understand the terms "Hispanic" or "non-Hispanic", but instead understood when the interviewer asked if they spoke Spanish at home. Based on this information, ethnicity was determined by if the student spoke Spanish at home. Additionally, "other" and "not sure" categories

were added as options to the race question, as some students did not identify with any option provided or were unsure of their race. No changes to the nutrition-related behavior questions on sweet snacks, salty snacks, SSB, fruits and vegetables were made and it was decided that a standard script would be provided when administering the survey for uniformity.

The student survey (Appendix F) included instruments provided by USDA CYFAR and those adapted from the Beverage and Snack Questionnaire.[90] Through self-recall, nutrition-related behavior questions assessed the following: "how many times did you eat a sweet snack yesterday between your meals?" (and same for salty snacks), "how many times did you drink a sugary drink yesterday? Do not include 100% fruit juice, chocolate milk or diet drinks.", as well as how many times in the previous day fruits and vegetables were consumed. Each question provided picture examples of the food or drink in question to help make clear what constituted a sweet snack, salty snack and SSB and help spur recall from the previous day's consumption. Picture examples of sweet snacks included cookies, sugary cereal, chocolate candy, non-chocolate candy, a cupcake, a toaster pastry, and a donut. Picture examples of salty snacks included chips, pretzels, French fries, party mix and crackers. Picture examples of SSB included soda, sports drinks, energy drinks, sweetened iced tea, and fruit drinks. All questions were multiple choice, with range option so of "0 times" to "5 or more times" consumed.

A semi-structured focus group guide was developed for the secondary, qualitative aim (Appendix G). This guide was pilot tested with a small group of same-aged children (n=4) for comprehension and clarity of questions. No questions were

changed, but the order of asking questions was altered so a response to one question would not influence conversation later in the focus group. The semi-structured focus group guide was organized by five sections: influence of food selection, memorable topics from the curriculum, perceived behavior change from the program, barriers to behavior change, and potential changes to the program.

Protocol for Data Collection

Each 3rd grade student was assigned a unique identification (ID) number. The ID sheet was locked in a secure cabinet in room 300 of the URI College of Continuing Education (CCE) in Providence, RI. For the primary and tertiary aims, educators collected demographic information including age, gender, race and ethnicity as well as nutrition-related behavior through Surveymonkey.com in both Spanish and English on iPads. Data were collected at three time points for both groups: baseline (week 1), post-assessment (week 13), and follow-up (week 27) with the control data collected within a 2-week period of treatment data. Survey questions always pertained to a week day. To complete all surveys, the students followed along as the educator read each question aloud to the class, allowing for visual and auditory understanding of the question. Set examples to clarify questions were provided with questions. The surveys took approximately 20 minutes to complete. If any student was absent, a rescheduled survey time was attempted to be made as close to the original date as possible. Process evaluation conducted throughout the intervention included weekly attendance of each student.

For the secondary aim, semi-structured focus groups were conducted during the school day in a quiet location within the school the students attended.[91, 92] The lead researcher was the moderator and the nutrition educator was the note taker, both of whom the students knew through the program. The moderator asked students if they could be taped via voice recorder, explained why the nutrition educator was taking notes, and provided ground rules and expectations of the conversation. Each focus group lasted approximately 20 minutes. Data saturation was reached when coding of data revealed no new themes.

Intervention

The primary aim used a modified version of the U. of Alabama's *Body Quest: Food of the Warrior* (BQ) curriculum (Appendix L).[54] The curriculum involved interactive, hands-on activities as well as seven iPad applications created for the BQ curriculum to reinforce topics taught by the educators who were registered dietitians. Each iPad application was between 8-15 minutes in length. Modifications to the curriculum included extending all 13 lessons from 30 minutes to one hour in length. This allowed each topic to be more robust with additional hands-on activities. It also allowed for additional topics not covered in the original curriculum to be taught. Such additional topics included breakfast, "Go, Slow, Whoa", MyPlate, fast food, and sugar-sweetened beverages. Lastly, the modified curriculum removed the FV tasting portion of the original curriculum and instead relying on the USDA Fresh Fruit and Vegetable Program fruit or vegetable provided in the classroom during the lesson. The modified BQ curriculum aligned with the Social Cognitive[45] and Experiential

Learning[46] theories to maximize learning and potential behavior change by the students. This modified curriculum was pilot tested with one 3rd grade classroom during the pilot year of the grant. Lesson topics for each week of the 13-week curriculum are below:

Week	Lesson Topics
1	Baseline Survey; Food Groups and BQ Character introduction
2	Trying new FV; Go, Slow & Whoa Food Groups; and iPad BQ Introductory App
3	Portion Sizes of FV and iPad BQ Activity 1 App
4	Eating Foods from All Food Groups and FV Variety
5	MyPlate and iPad BQ Activity 2 App
6	Balanced Meals and Adding FV into Meals & Snacks
7	Breakfast and iPad Activity 3 App
8	Function of Each Food Group and Fast Food
9	FV Functions of Each Color and iPad Activity 4 App
10	Snacks (sweet and salty)
11	Fiber and iPad Activity 5 App
12	Persuasive Messaging to Increase FV intake and Sugar-Sweetened Beverages
13	iPad Activity 6 App and Wrap-up of curriculum; Post-Assessment

The intervention school received a weekly one-hour in-class program for 13 weeks while the control school received no program.

The qualitative data was collected via semi-structured focus groups after the completion of the 13-week school-based program. The focus group conversation allowed the participating students to provide behavior change information not necessarily captured by quantitative assessments. Such information included what external influences and potential barriers contributed to their food selection as well as their perceived behavior changes from the 13-week school-based program. The focus group conversation also provided a space for the students to voice their feedback about the curriculum. The students expressed what content in the curriculum was most

memorable and what potential changes could be made. The table below provides the initial questions asked during the semi-structured focus groups.

Semi-Structured Focus Group Initial Question
Let's start with looking at some pictures *(have a piece of paper with two choices, one healthy and one unhealthy).* Which would you choose to eat? Why?
What do you remember learning last year in the class I taught?
Did anything you learn help you change the foods you eat and drinks you drink?
What are some things that you may be doing that you think may not be healthy? Can you tell me more about that?
Does anyone have anything else you would like to say about the nutrition program last year?

The "Family Night" series program was 1.5 hours for six consecutive weeks. The first 30 minutes were family dinner where the parents, along with the students and any siblings ("children"), ate a prepared dinner. All dinners were cooked and served by URI nutrition educators. Dinners included low-cost, healthy recipes such as vegetable lasagna, black bean burgers, sweet potato quesadillas, chicken broccoli and brown rice casserole, whole wheat blueberry pancakes, and stovetop whole wheat pizza. A side salad accompanied each main dish, along with water or low-fat, plain milk to drink and fruit for dessert. During dinner, the nutrition educators modeled positive parenting practices and reinforced nutrition concepts taught throughout the program. After dinner, parents/caregivers and children separated to receive their 1-hour of education.

The parents/caregivers received a modified version of Cornell University's *Healthy Children, Healthy Families: Parents Making a Difference!* curriculum (Appendix M).[93] This program was condensed from eight, 1.5 hour lessons to six, to

1-hour lessons and was enhanced by URI CYFAR nutrition materials. It taught nutrition topics and positive parenting practices leading to nutrition and physical activity behavior change in the home. Nutrition topics included sugar-sweetened beverages, fruits and vegetables, fast food, serving sizes, family meals, screen time, and physical activity. Positive parenting practices included firm and responsive parenting, shaping the child's environment, leading by example, division of responsibility in regards to meal time, and the concept of "can do". Parents/caregivers also learned how to make small, attainable goals to slowly make behavior changes. These 1-hour lessons were conversational and interactive between the educator and other parents/caregivers.

During the 1-hour of education, the children received a brief nutrition lesson, spent time on iPads to create content for a program recipe book, and prepared and cooked the recipe they were offered at dinner. Through interactive, hands-on activities, the brief nutrition lesson reviewed topics learned during the 13-week school-based program. Such topics included food groups and "Go, Slow, and Whoa" foods, MyPlate, variety and amount of fruits and vegetables, the importance of breakfast, and how to add vegetables into meals. The children also used iPad applications such as Doodle and iBook to create content and put together a recipe book as a final product of the "Family Night" series program. However, the real focus of the lesson was hands-on cooking. Using a modified version of the *Cooking with Kids* curriculum,[94] children had the opportunity to prepare, cook and sample the recipe served to them for dinner that evening (Appendix N). This showed the ease of making the recipe and motivated the children to try the recipe if they had not during dinner.

Data Analysis

Sample Size

G*Power version 3.0.10 was used to calculate sample size for the primary hypothesis. Sample size calculations were performed based on expected changes in SSB and EDS from year-one data.[95] The treatment group (n=70) had a significant decrease in SSB intake by a mean of 0.943±1.849 times per day and a significant decrease in EDS by 0.700±1.408 times per day; the control group (n=59) had no change in SSB intake (0.000±1.771 times per day) and a significant decrease in EDS by 0.415±1.402 times per day.[95] A required sample size of 118 and 768 3rd graders are necessary to determine the effect of the intervention on SSB and EDS, respectively, with an alpha set at 0.025 and statistical power at the 0.80 level.

Quantitative Analysis

For the primary and tertiary aims, the quantitative data collected via Surveymonkey.com was exported into Excel, saved, cleaned, and analyzed in IBM SPSS software (version 24.0, IBM SPSS Statistics, Armonk, NY, 2016). Numerical (skewness and kurtosis) and graphical (histogram) methods were used to determine normalcy. One additional variable was created from survey questions: "EDSAVG" (sweet and snack variables combined and averaged, Cronbach alpha .719).

For the primary aim, baseline Pearson Correlation between variables was run for both treatment and control groups. Independent t-tests and chi squared assessed any differences between the treatment and control group at baseline (week 1) for continuous and categorical variables, respectively. Paired t-tests were used to assess

within group differences from baseline (week 1) to post-assessment (week 13) and repeated analysis of variance for between group differences of EDSAVG, sweet snacks, salty snacks, and SSB. To account for the study design in which two out of the four schools served as both treatment and control groups within the three years, paired t-tests were ran for EDSAVG, sweet and salty snacks separately, and SSB for each treatment and control group involved in each year of data collection. This analysis detected if changes in behavior were due to the intervention and not the school, as well as if it was replicable with different schools and students. Significance was set at $p < 0.05$.

Similar statistics were run for the tertiary aim. Baseline Pearson Correlation between variables was run for both the treatment students who did the 13-week school-based program and their families attended the "Family Night" series program and for the treatment students who only participated in the 13-week school-based program. Independent t-tests and chi squared assessed any differences between the two groups at baseline for continuous and categorical variables, respectively. Paired t-tests were used to assess within group differences from post-assessment (week 13) to follow-up (week 27) and repeated analysis of variance for between group differences of EDSAVG, sweet snacks, salty snacks, and SSB. Significance was set at $p < 0.05$.

Qualitative Analysis

For the secondary aim, audio-recorded focus groups (n=16) were transcribed verbatim by a transcription service and were checked by the focus group moderator

and note taker for accuracy. Each transcript was coded using a hybrid approach of inductive and deductive thematic analysis.[96] This approach acknowledged the sections in the focus group protocol and also included any additional themes that emerged from the data during the coding process. The lead researcher utilized thematic analysis to detect themes from the content of the transcripts.[97] A codebook of structural and content codes was created and updated based on transcription readings. A second researcher coded 25% of the data and inter-rater agreement was calculated. There was a 94% agreement of coding, determined by the number of agreements divided by the sum of agreements and disagreements. These codes led to patterns and themes within each section.

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Appendix A:
Letter Sent Home

University of Rhode Island

CYFAR Children, Youth and Families At Risk Program

Providence Schools

DATE

Dear 3rd grade parent/caregiver,
Are you interested in helping kids eat better? _____ Elementary is partnering with the University of Rhode Island in an exciting project to study the effect of nutrition education and use of iPads on food choices of families. This project involves your 3rd grade child.
This year:

- 3rd graders will complete a survey in the fall, winter and spring in the classroom that asks questions such as their gender, age, and how often they do in-school and out-of-school activities; questions about the amount of fruits, vegetables, and snacks they eat; how many sugar-sweetened beverages they drink; and questions about using iPads.
- 3rd graders in the YMCA afterschool program at _____Elementary will fill out a similar survey two times (6 weeks apart) that asks the same questions as in-school but also about how much they like to cook and if they make food at home.

We hope that you become involved as well! You are so important to your child's eating habits. If you would like to take part, you will be asked to fill out a 15-minute survey two times (6 weeks apart) that asks questions such as your eating habits, the eating habits of your 3rd grade child and family meal practice; how much you like to use iPads; and information about your age, education level and ethnicity. As a thank you for your help, we will give you a kitchen tool like a cutting board to support healthy eating. All questions are optional. Details will be sent home with your 3rd grade child. If you have any questions, please contact the Parent and Family Service Liaison _____ at ###-#### or the University of Rhode Island community researcher Kate Balestracci at 277-5234.
Thank you!
Sincerely,
PRINCIPAL NAME
Principal
_____ Elementary

16 de octubre del 2015

Estimado padre/guardián de 3er grado,
¿Está usted interesado en ayudar a los niños a comer mejor? La Primaria _____ se está asociando con la Universidad de Rhode Island en un emocionante proyecto para estudiar el efecto de la educación en nutrición y el uso de iPads en las elecciones de alimentos de las familias. Este proyecto involucra a su hijo(a) de 3er grado.
Este año:

- Alumnos de 3er grado completarán una encuesta en el salón de clases en el otoño, invierno y en la primavera que les hará preguntas como de su género, edad y qué tan seguido hacen actividades dentro y fuera de la escuela; preguntas sobre la cantidad de frutas, vegetales y meriendas que ellos consumen; cuántas bebidas azucaradas beben; y preguntas sobre el uso de iPads.
- Alumnos de 3er grado dentro del programa después de clases de la YMCA en la primaria _____ llenarán una encuesta similar dos veces (6 semanas de diferencia) que les hará las mismas preguntas como en clase pero también sobre cuánto les gusta cocinar y si preparan alimentos en casa.

¡Esperamos que usted también se pueda involucrar! Usted es muy importante para los hábitos alimenticios de su hijo(a). Si le gustaría participar, se le pedirá que llene una encuesta de 15 minutos dos veces (6 semanas de diferencia) que le hará preguntas como de sus hábitos alimenticios, los hábitos alimenticios de su hijo(a) de 3er grado y las prácticas de sus comidas familiares; qué tanto le gusta usar iPads; e información sobre su edad, nivel de educación y etnicidad. Como un agradecimiento por su ayuda, le regalaremos un utensilio de cocina tal como una tabla de cortar para apoyar una alimentación saludable. Todas las preguntas son opcionales. Los detalles se mandarán a casa con su hijo(a) de 3er grado.
Si tiene cualquier pregunta, por favor comuníquese con el Coordinador de Servicios de Padres y Familiares _____ al ###-#### o con la investigadora comunitaria de la Universidad de Rhode Island Kate Balestracci al 277-5234.
¡Gracias!
Sinceramente,
PRINCIPAL NAME
Directora
Escuela Primaria _____

Appendix B:
Cold Call Script

Dialogue:

Hello, I am calling from _____ School about a chance for parents and other adults who care for _____ (name of child if available) or a student at the school.

I'd like to give you a little background. URI will be **conducting research by** teaching nutrition classes for _____ and all other third graders next year. URI will be offering an after school program as well. While teaching children about healthy eating is important, change doesn't happen without support from parents and other adults. You are your child's best teacher. You are also a role model. The University of Rhode Island will hold a series of **conversations** about ways adults can create:

healthy family meal times
encourage positive and healthy eating behaviors.

You, as a caregiver or parent of a third grader are invited to come to these free conversation groups. We hope you can join us. This is a research study conducted by the University of Rhode Island.

There will be 10 sessions. Each class will have:

- Conversations
- Teach you a physically active game to play with your child
- Give you free healthy, low-cost recipes, teach cooking skills and provide a sample of a delicious recipe you and your family can make at home
- Use of IPAD

Classes will start in the fall, in September or October and then go for 10 weeks

- There will be another chance to participate in a new class in January
- There will be a third series in the spring
- If you decided to come, what would be best for you? Fall, Winter or spring?

What is the best day of the week for you:

Monday
Tuesday
Wednesday
Thursday
Friday

What is the best time of the day?

- Morning
- Lunch time
- Early afternoon before school is out
- After school – 3 o'clock

My name is _____. I will be at the school on Wednesdays and Fridays in the cafeteria from 4-6 if you want to talk with me about the program. I look forward to meeting you in person.
Thank you for taking the time to talk with me.

Appendix C:
School Event Advertisement

What are we doing in Bailey this year?

Nutrition and iPads

For Parents:

Nutrition and Parenting class for 3rd grade parents

- Learn good nutrition for your family
- Have fun with an iPad

For your 3rd Grade Children:

Nutrition in the classroom

- Learn healthy nutrition habits and use iPads

Nutrition and Cooking in the after school program

- Cook and taste healthy recipes
- Create a recipe book on iPad

Appendix D:
Original "Family Night" Flyer

University of Rhode Island CYFAR Children, Youth and Families At Risk Program

Join the Nutrition Quest

Healthy Children Healthy Families

A research study through the University of Rhode Island
Department of Nutrition and Food Sciences

3rd Grade Families

Learn new skills and tools to build a healthier lifestyle.

Each week.....

- Dinner for you and your family

- Activities for your children during the program

- Recipes, cooking and food demonstrations

- Family games and activities

- A $50 gift card when you come to all 6 weeks

- Whole family fun!

WHEN: Wednesday nights 5:30p-7:00p
February 25th - April 1st

WHO: Parents/caregivers of current 3rd grade students at Bailey and children

QUESTIONS? Contact Kate at 277-5234 or katebr@uri.edu

TO SIGN UP: Fill out the form below and turn in by Thursday February 12th

---

TO JOIN, please fill out this form and send with your 3rd grade child.
Please have your 3rd grader give this completed form to their classroom teacher at Bailey by <u>Thursday February 12th</u>

3rd grade child's name: _____

3rd grade teacher's name (circle one): Ms. Hamel Ms. Schwartz Ms. Solomon Ms. Lentz

Parent/Caregiver's name: _____Phone number: _____

Email: _____Alternate phone number (if available): _____

Number of parents attending: _____ Number of children attending: _____

Appendix E:
Modified "Family Night" Flyer

University of Rhode Island CYFAR Children, Youth and Families At Risk Program

Join the Nutrition Quest

Healthy Children Healthy Families
A research study through the University of Rhode Island
Department of Nutrition and Food Sciences

Learn new skills and tools to build a healthier lifestyle.

Dinner for you and your family

Family games and activities

Free Recipes

Nutrition education lessons for the family

Cooking class for older children (3rd grade and up) & activities for younger siblings

Whole family fun!

WHEN: Wednesday nights 5:30p-7:00p
March 7, 2018 - April 11, 2018

WHO: Parents/caregivers and families of current 3rd grade students at Veazie

QUESTIONS? Contact Kelsi 401-862-7410 or Kelsi_chappell@uri.edu

TO SIGN UP: Fill out the form below and turn in by Thursday March 1st or call/email!

☐ Yes, we can attend ☐ No, we cannot attend Parent signature _____

(please fill out below)

TO JOIN, please fill out this form and send with your 3rd grade child. Please have your 3rd grader give this completed form to their classroom teacher at Veazie by Thursday February 9th

3rd grade child's name: _____

3rd grade teacher's name (circle one): Mrs. Paris O'brien Mrs. Longo Ms. Passett Mrs. Bracewell

Parent/Caregiver's name: _____Phone number: _____

Email: _____Alternate phone number (if available): _____

What is the best way to contact you? (circle all that apply): Call me Text me Email me

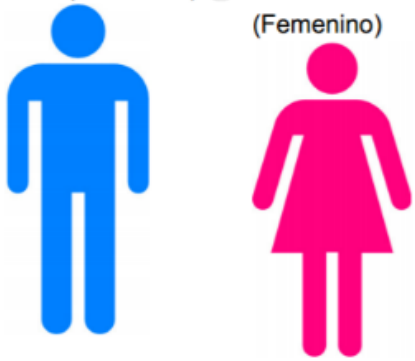
Appendix F:
In-School Baseline, Post-Assessment, and Follow-up Survey Questions for both Treatment and Control groups

CYFAR In-School Pre-Survey

Directions: Please select the appropriate response for each of the following questions.
(Instrucciones: selecciona la respuesta correcta para cada una de las siguientes preguntas.)

I am a...
(Soy de sexo...)

○ Male (Masculino) ○ Female (Femenino)



How old are you?
(¿Cuántos años tienes?)

○ 7 ○ 8 ○ 9 ○ 10 ○ 11

CYFAR In-School Pre-Survey

What grade are you in school?
(¿En qué grado de la escuela estás?)

- 1st grade (1.er grado)
- 2nd grade (2.º grado)
- 3rd grade (3.er grado)
- 4th grade (4.º grado)
- 5th grade (5.º grado)
- 6th grade (6.º grado)
- 7th grade (7.º grado)
- 8th grade (8.º grado)

Do you speak Spanish at home?
(¿Hablas español en tu casa?)

- Yes (Sí)
- No (No)
- Sometimes (A veces)

CYFAR In-School Pre-Survey

Are you...
(¿Eres...)

- [ ] American Indian or Alaska Native (indio americano o nativo de Alaska?)
- [ ] Asian (asiático?)
- [ ] Black or African American (negro o afroamericano?)
- [ ] Native Hawaiian or Pacific Islander (nativo de Hawái o de otras islas del Pacífico?)
- [ ] White (blanco?)
- [ ] Other (otro?)
- [ ] Not Sure (No estoy seguro)

Are either of your parents in the military (for example, the Air Force, Army, Guard, Marine Corps, Navy, or Reserve)?
(¿Alguno de tus padres está en las fuerzas armadas (por ejemplo, en la Fuerza Aérea, en el Ejército, en la Guardia Nacional, en la Infantería de Marina, en la Marina o en la Reserva)?)

- ○ Yes (Sí)
- ○ No (No)
- ○ I don't know (No sé)

Which of these do they work for?
(¿En cuál de estas fuerzas armadas trabajan?)

- ○ Air Force (Fuerza Aérea)
- ○ Army (Ejército)
- ○ Guard (Guardia Nacional)
- ○ Marine Corps (Infantería de Marina)
- ○ Navy (Marina)
- ○ Reserve (Reserva)
- ○ I don't know (No sé)

CYFAR In-School Pre-Survey

How long have you participated in 4-H?
(¿Cuánto tiempo participaste en el programa 4H?)

- ○ Less than 1 year (Menos de 1 año)
- ○ 1 year (1 año)
- ○ 2-3 years (2 a 3 años)
- ○ 4-5 years (4 a 5 años)
- ○ 6-7 years (6 a 7 años)
- ○ 8-9 years (8 a 9 años)
- ○ 10 or more years (10 o más años)
- ○ Does not apply to me (No es aplicable para mí)

CYFAR In-School Pre-Survey

How long have you participated in any in-school activities like sports, student government, drama or dance, academic clubs, pep clubs, band or symphony?
(¿Cuánto tiempo participaste en actividades escolares como deportes, gobierno estudiantil, teatro, danzas, clubes académicos, "pep clubs", bandas u orquestas sinfónicas?)

- ○ Less than 1 year (Menos de 1 año)
- ○ 1 year (1 año)
- ○ 2-3 years (2 a 3 años)
- ○ 4-5 years (4 a 5 años)
- ○ 6-7 years (6 a 7 años)
- ○ 8-9 years (8 a 9 años)
- ○ 10 or more years (10 o más años)
- ○ Does not apply to me (No es aplicable para mí)

How long have you participated in any other out-of-school activities like Boy Scouts, Girl Scouts, YMCA, Girls Inc., Junior Achievement, or youth groups at church, synagogue, or mosques?
(¿Cuánto tiempo has participado en actividades fuera de la escuela, por ejemplo, en actividades de organizaciones como las de "Boy Scouts" (niños exploradores), "Girl Scouts" (niñas exploradoras), "YMCA" (Asociación de Jóvenes Cristianos), "Girls Inc.", "Junior Achievement" o en los grupos juveniles de las iglesias, sinagogas o mezquitas?)

- ○ Less than 1 year (Menos de 1 año)
- ○ 1 year (1 año)
- ○ 2-3 years (2 a 3 años)
- ○ 4-5 years (4 a 5 años)
- ○ 6-7 years (6 a 7 años)
- ○ 8-9 years (8 a 9 años)
- ○ 10 or more years (10 o más años)
- ○ Does not apply to me (No es aplicable para mí)

CYFAR In-School Pre-Survey

Please answer the following questions about what you ate yesterday. (Responde a las siguientes preguntas sobre qué comiste ayer.)

These are some examples of sugary drinks: (Estos son algunos ejemplos de bebidas azucaradas:)

How many times did you drink a sugary drink yesterday?
For this question, do NOT include 100% fruit juice, chocolate milk, or diet drinks. (¿Cuántas veces bebiste una bebida azucarada ayer? Para responder a esta pregunta, NO incluyas el jugo de frutas 100 % natural, la leche chocolatada ni las bebidas dietéticas.)

- 0 times (0 veces)
- 1 time (1 vez)
- 2 times (2 veces)
- 3 times (3 veces)
- 4 times (4 veces)
- 5 or more times (5 veces o más)

CYFAR In-School Pre-Survey

These are some examples of sweet snacks: (Estos son algunos ejemplos de refrigerios dulces:)

How many times did you eat a sweet snack yesterdaybetween your meals? (¿Cuántas veces comiste ayer un refrigerio dulce entre las comidas?)

- 0 times (0 veces)
- 1 time (1 vez)
- 2 times (2 veces)
- 3 times (3 veces)
- 4 times (4 veces)
- 5 or more times (5 veces o más)

CYFAR In-School Pre-Survey

These are some examples of salty snacks: (Estos son algunos ejemplos de refrigerios salados:)

How many times did you eat a salty snacks yesterdaybetween your meals? (¿Cuántas veces comiste ayer un refrigerio saladoentre las comidas?)

- 0 times (0 veces)
- 1 time (1 vez)
- 2 times (2 veces)
- 3 times (3 veces)
- 4 times (4 veces)
- 5 or more times (5 veces o más)

CYFAR In-School Pre-Survey

Each of these is an example of eating fruit 1 time: (Cada uno de estos es un ejemplo de comer fruta 1 vez:)

How many times did you eat fruit yesterday? For this question, doNOT include fruit juice.
(¿Cuántas veces comiste fruta ayer? Para responder a esta pregunta, NO incluyas el jugo de fruta.)

- 0 times (0 veces)
- 1 time (1 vez)
- 2 times (2 veces)
- 3 times (3 veces)
- 4 times (4 veces)
- 5 or more times (5 veces o más)

CYFAR In-School Pre-Survey

Each of these is an example of eating vegetables <u>1 time:</u> (Cada uno de estos es un ejemplo de comer vegetales 1 vez:)





Salad


Potato


Black Beans

How <u>many times</u> did you eat vegetables yesterday? Do<u>NOT</u> include french fries. (¿Cuántas veces comiste vegetales ayer? NO incluyas las papas fritas.)

- ○ 0 times (0 veces)
- ○ 1 time (1 vez)
- ○ 2 times (2 veces)
- ○ 3 times (3 veces)
- ○ 4 times (4 veces)
- ○ 5 or more times (5 veces o más)

CYFAR In-School Pre-Survey

Directions: The next 9 questions ask about your eating habits and how hard you think it would be for you to eat more of some foods and eat less of other foods.
(Instrucciones: las siguientes 9 preguntas son para conocer tus hábitos alimentarios y saber qué tan difícil piensas que sería para ti comer más de algunos alimentos y comer menos de otros alimentos.)

	Not hard at all (No sería difícil)	A little hard (Un poco difícil)	Very hard (Muy difícil)
How hard would it be for you to eat fruit for an after school snack? (¿Qué tan difícil sería para ti comer fruta como refrigerio después de la escuela?)	○	○	○
How hard would it be for you to eat vegetables for a snack? (¿Qué tan difícil sería para ti comer vegetales como refrigerio?)	○	○	○
How hard would it be for you to choose water instead of soda or Kool-Aid when you are thirsty? (¿Qué tan difícil sería para ti elegir agua en lugar de un refresco o KoolAid cuando tienes sed?)	○	○	○
How hard would it be for you to drink low-fat or fat-free milk instead of 2% or whole milk?(¿Qué tan difícil sería para ti beber leche baja en grasas o sin grasa en lugar de leche con 2 % de grasa o leche entera?)	○	○	○
How hard would it be for you to choose a small instead of a large order of french fries? (¿Qué tan difícil sería para ti elegir una porción pequeña de papas fritas en lugar de una porción grande?)	○	○	○
How hard would it be for you to eat smaller servings of foods like chips, snack cakes, cookies, or ice cream? (¿Qué tan difícil sería para ti comer porciones más pequeñas de alimentos como "chips", pastelillos, galletas o helados?)	○	○	○
How hard would it be for you to eat a snack like pretzels instead of chips? (¿Qué tan difícil sería para ti comer un refrigerio como "pretzels" en lugar de "chips"?)	○	○	○

	Not hard at all (No sería difícil)	A little hard (Un poco difícil)	Very hard (Muy difícil)
How hard would it be for you to drink less soda? (¿Qué tan difícil sería para ti beber menos refrescos?)	○	○	○
How hard would it be for you to drink less Kool-Aid? (¿Qué tan difícil sería para ti beber menos KoolAid?)	○	○	○

CYFAR In-School Pre-Survey

Directions: Choose the answer which best shows how you feel.
(Instrucciones: elige la respuesta que mejor representa lo que piensas.)

	No (No)	Sometimes (A veces)	Yes (Sí)	I Don't Know (No sé)
I enjoy doing things on a computer/iPad. (Me gusta hacer cosas en la computadora o el iPad.)	○	○	○	○
I am tired of using a computer/iPad. (Estoy cansado de usar la computadora o el iPad.)	○	○	○	○
When you use a computer or iPad, are you able to pay attention? (Cuando usas una computadora o un iPad, ¿puedes prestar atención?)	○	○	○	○
I enjoy computer/iPad games very much. (Me gustan mucho los juegos de la computadora o del iPad.)	○	○	○	○
I would work harder if I could use computers/iPads more often. (Podría trabajar más si pudiera usar una computadora o un iPad más a menudo.)	○	○	○	○
I know that computers/iPads give me the chance to learn many new things. (Sé que las computadoras y los iPad me dan la oportunidad de aprender muchas cosas nuevas.)	○	○	○	○
I can learn many things when I use a computer/iPad. (Cuando uso una computadora o un iPad, puedo aprender muchas cosas.)	○	○	○	○
I enjoy lessons on the computer/iPad. (Me gusta estudiar las lecciones en la computadora o en el iPad.)	○	○	○	○
I think that it is very important for me to learn how to use a computer/iPad. (Creo que aprender a usar una computadora o un iPad es muy importante para mí.)	○	○	○	○

CYFAR In-School Pre-Survey

How many other children live in your home?
(¿Cuántos otros niños viven en tu casa?)

- ○ None (ninguno)
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ More than 4 (Más de 4)

On most nights, who makes dinner for you?
(¿Quién prepara la cena para ti la mayoría de las noches?)

- ○ My mom (Mi madre)
- ○ My dad (Mi padre)
- ○ Myself (Yo mismo)
- ○ My brother or sister (Mi hermano o hermana)
- ○ Another adult that is not my mom or dad (grandparent, aunt, uncle, babysitter) (Otro adulto que no es mi madre o padre (abuelo, abuela, tío, tía, niñera))
- ○ I do not eat dinner (Yo no como la cena)

You are finished! Thank you for completing the survey.
(¡Terminaste! Gracias por completar la encuesta.)

Additional In School Post-Assessment (only) Survey Questions

CYFAR In-School Post-Survey

Who usually does most of your family's food shopping? ¿Quién normalmente va de compras para su familia?

- ○ Myself (*Yo*)
- ○ My mom or dad (*Mi madre or padre*)
- ○ Another adult that is not my mom or dad (grandparent, aunt, uncle, babysitter) (*Otro adulto que no es mi madre o padre (abuelo/abuela, tio/tia,niñera)*)
- ○ My sister or brother (*Mi hermano o hermana*)

Additional In School Follow-Up (only) Survey Questions

CYFAR TREATMENT In-School MAY Post-Survey

Are you doing anything different since you became a Body Quest warrior? (check all that apply) (Has estado haciendo algo diferente desde que te convertiste en un Body Quest warrior? (Marca todas las respuestas que apliquen)

- ☐ I have added more vegetables to my lunch (He agregado más verduras a mi almuerzo)
- ☐ I eat a variety of fruits and vegetables (Como una variedad de frutas y verduras)
- ☐ I usually make half of my plate fruits and vegetables at lunch (Usualmente pongo frutas y verduras en la mitad de mi plato en el almuerzo)
- ☐ I make healthier choices at fast food restaurants (Hago mejores elecciones en los restaurantes de comida rápida)
- ☐ I drink more GO drinks (Bebo más bebidas GO)
- ☐ I drink less WHOA and NO drinks (Bebo menos bebidas WHOA y NO)
- ☐ I eat breakfast more often (Desayuno más seguido)
- ☐ I choose high fiber foods more often (Elijo alimentos altos en fibra más seguido)

Appendix G:
Focus Group Guide

CYFAR In School Program Focus Group Moderator Guide

Time: 20 minutes
Audience: current 3rd graders ; ~4 per focus group
Directions for Moderator:

The purpose of the focus group is to determine the following:
1) Do the children feel they made any changes in their food/beverage behavior over the last year, were these changes related to the program and, if so, what was it about the nutrition program that affected their food/beverage behavior?
2) What are the barriers to becoming and staying healthy and did the program help reduce these barriers? If It did help reduce the barriers, what was it about the program that helped?
3) What would they like to see if we could change the program in the future?
To help the students answer the questions honestly, make them feel welcome, explain that there is no right or wrong answer and that they are not being judged or graded on what they say. Explain that they are here to help us determine what works and what does not work with providing nutrition education to 3rd graders.

Say:
Thank you so much for coming! Today we are going to talk about eating habits. I am going to ask some questions, and after each question I will give you all some time to talk and answer if you want to. Remember, we want to hear what everyone has to say, so make sure to take turns and speak one at a time and let's make sure that we listen and respect each other. Also, you don't have to go in order, if you have something to say you can just say it. You do not have to answer a question if you do not want to. But, just so you know, there is no right or wrong answer and you will not be graded on anything you say. We just want truthful answers. Can anyone tell me what it means to tell the truth? Are there any questions before I get started?

- Let's start with looking at some pictures *(have a piece of paper with two choices, one healthy and one unhealthy)*. Which would you choose to eat? *(use this as a baseline to start conversation)*
- Why did you choose the food that you did?
- What do you remember learning last year in the class I taught? *(make a list as a group on a large piece of paper*)
    - Prompt: if they do not remember the curriculum, show them a picture of the BQ warriors
- Did anything you learn help you change the foods you eat and drinks you drink?
    - Probe: Learning is one thing, but actually doing something because of it is another! For example, we can learn that milk is healthy to

drink every day, but it does not mean we will do it, right? So, is there anything you learned that had an effect on what foods you eat?

- What are some things that you may be doing that you think may <u>not</u> be healthy? Can you tell me more about that?
    - Probe: What do you like about these foods? How do you feel about these foods?
- Does anyone have anything else you would like to say about the nutrition program last year?
    - Probe – what would you like to see changed? What did you really like?
- Thank you so much for taking the time to meet with me today. This information has been very helpful.

Appendix H:
Parent/Caregiver Consent Form- Treatment Group

THE
UNIVERSITY
OF RHODE ISLAND

COLLEGE OF
HEALTH SCIENCES

The University of Rhode Island
Department of Nutrition and Food Sciences
Address 132 Fogarty Hall
Title of Project: Integrating Nutrition Education into Providence Full Service Community Schools

CONSENT FORM FOR RESEARCH

You are invited to take part in a University of Rhode Island research project described below. The researcher will explain the project to you in detail. You should feel free to ask questions. If you have more questions later, Linda Sebelia and Kate Balestracci can be reached at 401-874-2253, and will discuss them with you. You must be at least 18 years old to be in this research project.

Description of the project:
This study will work with 150 parents of 3rd graders in four Providence Schools. The goal of this project is to encourage parents to choose healthier foods for their families.

What will be done:
If you decide to take part in this study here is what will happen: A 6-week parent nutrition workshop on feeding your children, stretching your food dollar, and cooking will be taught by University of Rhode Island nutritionists. The workshop will be held in the Full Service School setting. Each session is 1.5 hours in length. In addition, you will learn how to use an iPad. You will be asked to answer questions at the beginning and end of the program. These questions should take about 15 minutes to answer.

Risks or discomfort:
There are no foreseeable risks or discomforts.

Benefits of this study:
You will receive nutrition and child-feeding practice tips. You will be able to sample new foods and recipes. You will also gain health-related knowledge that you can apply at home. Your participation will provide information to see how

well these workshops change behaviors that may affect the health of you and your family and help us improve programs for other families.

Confidentiality:
Your part in this study is confidential. None of the information will identify you by name. All records will be stored in a locked file cabinet at 80 Washington Street, Providence, RI.

Decision to quit at any time:
The decision to take part in this study is up to you. You do not have to take part. If you decide to take part in the study, you may quit at any time. If you choose to quit, you can continue to participate in other adult programs and your children will not be affected in any way. If you wish to quit, tell Linda Sebelia or Kate Balestracci 401-874-2253 of your choice. You do not have to answer any question you do not want to answer, simply skip the question. Skipping the question will not affect your participation in any way.

Rights and Complaints:
If you are not happy with the way this study is performed, you may discuss your complaints with Linda Sebelia at 401-874-2253 or with Kate Balestracci at 401-874-2253, anonymously, if you choose. In addition, if you have questions about your rights as a research participant, you may contact the office of the Vice President for Research and Economic Development, 70 Lower College Road, Suite 2, University of Rhode Island, Kingston, Rhode Island, telephone: (401) 874-4328.

You have read the Consent Form. Your questions have been answered. Your signature on this form means that you understand the information and you agree to take part in this study.

_____ _____
Signature of Participant Signature of Researcher

_____ _____
Typed/printed Name Typed/printed name

_____ _____
Date Date

Please sign both consent forms, keeping one for yourself

THE
UNIVERSITY
OF RHODE ISLAND

COLLEGE OF
HEALTH SCIENCES

Universidad de Rhode Island
Departamento de Ciencias de la Nutrición y los Alimentos
Dirección: 132 Fogarty Hall
Título del proyecto: Integrating Nutrition Education into Providence Full Service Community Schools (Integración de la educación en nutrición en las escuelas comunitarias de servicio completo de Providence)

FORMULARIO DE CONSENTIMIENTO PARA INVESTIGACIONES

Se lo invita a participar en el proyecto de investigación de la Universidad de Rhode Island, descrito a continuación. El investigador le explicará el proyecto en detalle. No vacile en hacer las preguntas que desee. Si más tarde desea hacer otras preguntas, puede llamar al 401-874-2253 para comunicarse con Linda Sebelia y Kate Balestracci, quienes responderán sus consultas. Para participar en este proyecto de investigación, usted debe tener 18 años como mínimo.

Descripción del proyecto:

Este estudio se llevará a cabo con 150 padres de niños de tercer grado, de cuatro escuelas de Providence. El objetivo del proyecto es alentar a los padres para que elijan alimentos más saludables para sus familias.

Qué se hará:

Si decide participar en este estudio, asistirá a un taller de nutrición dirigido a padres, que durará 6 semanas y donde se tratarán temas de alimentación de los hijos, mejora del rendimiento del dinero que se gasta en alimentos y cocina. El taller será dictado por nutricionistas de la Universidad de Rhode Island y se realizará en el edificio de la escuela comunitaria de servicio completo. Cada sesión durará una hora y media. Además, se le enseñará a usar un iPad. Al principio y al final del programa, se le pedirá que responda a algunas preguntas. Responder a esas preguntas le tomará unos 15 minutos.

Riesgos o incomodidad:

No hay riesgos ni incomodidades previsibles.

Beneficios del estudio:

Recibirá consejos para la práctica de la nutrición y alimentación de sus hijos. Podrá degustar nuevos alimentos y recetas. También adquirirá conocimientos relacionados con la salud, que podrá aplicar en su hogar. Su participación proporcionará información para saber hasta qué punto estos talleres cambian comportamientos que pueden afectar su salud y la de su familia, y para mejorar los programas para otras familias.

Confidencialidad:
Su participación en este estudio es confidencial. La información no lo identificará por su nombre. Todos los registros se guardarán en un archivador cerrado con llave, en el edificio situado en 80 Washington Street, Providence, Rhode Island.
Decisión de abandonar el estudio en cualquier momento:
Usted decide si desea participar en este estudio. No tiene obligación de hacerlo. Si decide participar en el estudio, puede abandonarlo en cualquier momento. Si elige abandonarlo, puede continuar participando en otros programas para adultos, y sus hijos no se verán afectados de ninguna manera. Si desea abandonar el estudio, informe su decisión a Linda Sebelia o a Kate Balestracci, llamando al 401-874-2253. Usted no tiene que responder a cualquier pregunta que no quiere contestar, sólo hay que saltarse la pregunta. Saltarse la pregunta no afectará su participación de ninguna manera.
Derechos y quejas:
Si usted no está satisfecho con la forma en que el estudio se lleva a cabo, puede plantear sus quejas a Linda Sebelia o a Kate Balestracci, llamando al 401-874-2253. Si lo desea, puede hacerlo de manera anónima. Además, si desea hacer preguntas sobre sus derechos como participante en la investigación, puede comunicarse con la oficina del vicepresidente de Investigación y Desarrollo Económico: Office of the Vice President for Research and Economic Development, 70 Lower College Road, Suite 2, University of Rhode Island, Kingston, Rhode Island, teléfono (401) 874-4328.

Usted ha leído el formulario de consentimiento. Sus preguntas fueron contestadas. Su firma en este formulario significa que usted comprende la información y acepta participar en este estudio.

Firma del participante	Firma del investigador
Nombre escrito a máquina o en letra de imprenta	Nombre escrito a máquina o en letra de imprenta
Fecha	Fecha

Firme ambos formularios de consentimiento y conserve uno para usted.

Appendix I:
Parent/Caregiver Consent Form- Control Group

THE
UNIVERSITY
OF RHODE ISLAND

COLLEGE OF
HEALTH SCIENCES

The University of Rhode Island
Department of Nutrition and Food Sciences
Address 132 Fogarty Hall
Title of Project: Integrating Nutrition Education into Providence Full Service Community Schools

CONSENT FORM FOR RESEARCH

You are invited to take part in a University of Rhode Island research project described below. The researcher will explain the project to you in detail. You should feel free to ask questions. If you have more questions later, Linda Sebelia and Kate Balestracci can be reached at 401-874-2253, and will discuss them with you. You must be at least 18 years old to be in this research project.

Description of the project:
This study will work with 150 parents of 3rd graders in four Providence Schools. The goal of this project is to encourage parents to choose healthier foods for their families.

What will be done:
If you decide to take part in this study here is what will happen: you will be asked to answer questions at the beginning and end of the program. These questions should take about 15 minutes to answer.

Risks or discomfort:
There are no foreseeable risks or discomforts.

Benefits of this study:
Your participation will provide information to see how well these workshops change behaviors that may affect the health of you and your family and help us improve programs for other families.

Confidentiality:
Your part in this study is confidential. None of the information will identify you by name. All records will be stored in a locked file cabinet at 80 Washington Street, Providence, RI.

Decision to quit at any time:
The decision to take part in this study is up to you. You do not have to take part. If you decide to take part in the study, you may quit at any time. If you choose to quit, you can continue to participate in other adult programs and your children will not be affected in any way. If you wish to quit, tell Linda Sebelia or Kate Balestracci 401-874-2253 of your choice.

Rights and Complaints:
If you are not happy with the way this study is performed, you may discuss your complaints with Linda Sebelia at 401-874-2253 or with Kate Balestracci at 401-874-2253, anonymously, if you choose. In addition, if you have questions about your rights as a research participant, you may contact the office of the Vice President for Research and Economic Development, 70 Lower College Road, Suite 2, University of Rhode Island, Kingston, Rhode Island, telephone: (401) 874-4328.

You have read the Consent Form. Your questions have been answered. Your signature on this form means that you understand the information and you agree to take part in this study.

_____ _____
Signature of Participant Signature of Researcher

_____ _____
Typed/printed Name Typed/printed name

_____ _____
Date Date

Please sign both consent forms, keeping one for yourself

THE
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Universidad de Rhode Island
Departamento de Ciencias de la Nutrición y los Alimentos
Dirección: 132 Fogarty Hall
Título del proyecto: Integrating Nutrition Education into Providence Full Service Community Schools (Integración de la educación en nutrición en las escuelas comunitarias de servicio completo de Providence)

FORMULARIO DE CONSENTIMIENTO PARA INVESTIGACIONES

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Descripción del proyecto:

Este estudio se llevará a cabo con 150 padres de niños de tercer grado, de cuatro escuelas de Providence. El objetivo del proyecto es alentar a los padres para que elijan alimentos más saludables para sus familias.

Qué se hará:

Si decide participar en este estudio: al principio y al final del programa, se le pedirá que responda a algunas preguntas. Responder a esas preguntas le tomará unos 15 minutos.

Riesgos o incomodidad:

No hay riesgos ni incomodidades previsibles.

Beneficios del estudio:

Su participación proporcionará información para saber hasta qué punto estos talleres cambian comportamientos que pueden afectar su salud y la de su familia, y para mejorar los programas para otras familias.

Confidencialidad:

Su participación en este estudio es confidencial. La información no lo identificará por su nombre. Todos los registros se guardarán en un archivador cerrado con llave, en el edificio situado en 80 Washington Street, Providence, Rhode Island.

Decisión de abandonar el estudio en cualquier momento:

Usted decide si desea participar en este estudio. No tiene obligación de hacerlo. Si decide participar en el estudio, puede abandonarlo en cualquier momento. Si elige abandonarlo, puede continuar participando en otros programas para adultos, y sus hijos no se verán afectados de ninguna manera. Si desea abandonar el estudio, informe su decisión a Linda Sebelia o a Kate Balestracci, llamando al 401-874-2253.

Derechos y quejas:
Si usted no está satisfecho con la forma en que el estudio se lleva a cabo, puede plantear sus quejas a Linda Sebelia o a Kate Balestracci, llamando al 401-874-2253. Si lo desea, puede hacerlo de manera anónima. Además, si desea hacer preguntas sobre sus derechos como participante en la investigación, puede comunicarse con la oficina del vicepresidente de Investigación y Desarrollo Económico: Office of the Vice President for Research and Economic Development, 70 Lower College Road, Suite 2, University of Rhode Island, Kingston, Rhode Island, teléfono (401) 874-4328.

Usted ha leído el formulario de consentimiento. Sus preguntas fueron contestadas. Su firma en este formulario significa que usted comprende la información y acepta participar en este estudio.

Firma del participante	Firma del investigador
Nombre escrito a máquina o en letra de imprenta	Nombre escrito a máquina o en letra de imprenta
Fecha	Fecha

Firme ambos formularios de consentimiento y conserve uno para usted.

Appendix J:
Parent/Caregiver Baseline and Post-Assessment Survey Questions for both Treatment and Control groups

CYFAR Parent/Caregiver Pre-Survey

When deciding what to feed your family, how often do you think about healthy food choices?

Cuando decide qué alimentar a su familia, con qué frecuencia piensa en alimentos saludables?

- ○ Less than 1 day each week (*Menos de 1 día a la semana*)
- ○ 1-2 days a week (*1 a 2 días a la semana*)
- ○ 3-4 days a week (*3 a 4 días a la semana*)
- ○ 5-6 days a week (*5 a 6 días a la semana*)
- ○ Every day (*Todos los días*)

How many days each week do you usually eat fruit (including fresh, dried, frozen, and canned)?

¿Cuántos días a la semana por lo general usted come frutas (incluyendo frutas frescas, secas, congeladas, o enlatadas)?

- ○ None (*Ninguno*)
- ○ 1-2 days a week (*1-2 días a la semana*)
- ○ 3-4 days a week (*3-4 días a la semana*)
- ○ 5-6 days a week (*5-6 días a la semana*)
- ○ Every day (*Todos los días*)

CYFAR Parent/Caregiver Pre-Survey

How many days each week do you usually eat vegetables (including fresh, frozen, and canned)?

¿Cuántos días a la semana por lo general usted come verduras (incluyendo verduras frescas, congelads, o enlatadas)?

- ○ None (*Ninguno*)
- ○ 1-2 days a week (*1-2 días a la semana*)
- ○ 3-4 days a week (*3-4 días a la semana*)
- ○ 5-6 days a week (*5-6 días a la semana*)
- ○ Every day (*Todos los días*)

How often do you drink regular (NOT diet) soda?

¿Con qué frecuencia usted toma soda regular (NO de dieta)?

- ○ Less than 1 day each week (*Menos de 1 día a la semana*)
- ○ 1-3 days a week (*1-3 días a la semana*)
- ○ 4-6 days a week (*4-6 días a la semana*)
- ○ Once each day (*Una vez al día*)
- ○ 2 or more times each day (*2 o más veces al día*)

CYFAR Parent/Caregiver Pre-Survey

How often do you use 1% milk, skim milk, or low-fat yogurt?

¿Con qué frecuencia usted usa leche de 1% leche, sin grasa, o yogur bajo en grasa?

- ○ Never (*Nunca*)
- ○ Less than once each day (*Menos de una vez al día*)
- ○ Once each day (*Una vez al*)
- ○ Twice each day (*Dos veces al día*)
- ○ 3 or more times each day (*3 o más veces al día*)

How often are you physically active for at least 30 minutes a day - active enough that you breathe a little harder or your heart beats faster? This includes brisk walking, dancing, and playing actively with kids.

¿Con qué frecuencia usted hace actividad física por lo menos 30 minutos al día? Actividad física significa hacer actividad que le haga respirar con más fuerza o haga su corazón latir más rápido. Esto incluye caminar rápido, bailar, o jugar activamente con sus niños.

- ○ Less than 1 day each week (*Menos de 1 día a la semana*)
- ○ 1-2 days a week (*1-2 días a la semana*)
- ○ 3-4 days a week (*3-4 días a la semana*)
- ○ 5-6 days a week (*5-6 días a la semana*)
- ○ Every day (*Todos los días*)

CYFAR Parent/Caregiver Pre-Survey

How many days each week do your children usually eat vegetables (including fresh, frozen, and canned)?

¿Cuántos días a la semana por lo general sus niños comen verduras (incluyendo verduras frescas, congeladas, o enlatadas)?

- ○ None (*Ninguno*)
- ○ 1-2 days a week (*1-2 días a la semana*)
- ○ 3-4 days a week (*3-4 días a la semana*)
- ○ 5-6 days a week (*5-6 días a la semana*)
- ○ Every day (*Todos los días*)

CYFAR Parent/Caregiver Pre-Survey

How often do your children drink regular (NOT diet) soda?

¿Con qué frecuencia sus niños toman soda regular (NO de dieta)?

- ○ Less than 1 day each week (*Menos de 1 día a la semana*)
- ○ 1-3 days a week (*1-3 días a la semana*)
- ○ 4-6 days a week (*4-6 días a la semana*)
- ○ Once each day (*Una vez al día*)
- ○ 2 or more times each day (*2 o más veces al día*)

CYFAR Parent/Caregiver Pre-Survey

How often do you children have 1% milk, skim milk, or low-fat yogurt?

¿Con qué frecuencia sus niños consumen leche de 1%, leche sin grasa, o yogur bajo en grasa?

- ○ Never (*Nunca*)
- ○ Less than once each day (*Menos de una vez al día*)
- ○ Once each day (*Una vez al día*)
- ○ Twice each day (*Dos veces al día*)
- ○ 3 or more times each day (*3 o más veces al día*)

In a typical week, how often do you let your children decide how much food to eat?

En una semana típica, ¿con qué frecuencia deja usted que sus niños decidan cuanta comida comer?

- ○ Almost never (*Casi nunca*)
- ○ Less than half the time (*Menos de la mitad del tiempo*)
- ○ Half the time (*Medio tiempo*)
- ○ More than half the time (*Más de la mitad del tiempo*)
- ○ Almost always (*Casi siempre*)

CYFAR Parent/Caregiver Pre-Survey

How much time do your children spend watching TV, using the computer, or playing video games?

¿Cuánto tiempo sus niños pasan frente a la televisión, la computadora, o jugando juegos de video?

- ○ Less than 1 hour each day (*Menos de una hora al día*)
- ○ 1-2 hours each day (*1-2 horas al día*)
- ○ 3-4 hours each day (*3-4 horas al día*)
- ○ 5-6 hours each day (*5-6 horas al día*)
- ○ 7 or more hours each day (*7 o más horas al día*)

How often do your children play actively for at least 60 minutes a day - active enough that they breathe a little harder or their hearts beat faster?

¿Con qué frecuencia sus niños hacen actividad física por lo menos 60 minutos al día? Actividad física significa hacer actividad que les haga respirar con más fuerza o haga sus corazones latir más rápido.

- ○ Less than 1 day each week (*Menos de 1 día a la semana*)
- ○ 1-2 days a week (*1-2 días a la semana*)
- ○ 3-4 days a week (*3-4 días a la semana*)
- ○ 5-6 days a week (*5-6 días a la semana*)
- ○ Every day (*Todos los días*)

CYFAR Parent/Caregiver Pre-Survey

How often do your children usually eat take out, delivery, or fast foods (such as burgers, fried chicken, pizza, Chinese food)?

¿Con qué frecuencia comen sus niños comidas rápidas o comidas ordenadas de afuera (como hamburguesas, pollo frito, pizza, comida China)?

- ○ Less than 1 day each week (*Menos de 1 día a la semana*)
- ○ 1-2 days a week (*1-2 días a la semana*)
- ○ 3-4 days a week (*3-4 días a la semana*)
- ○ 5-6 days a week (*5-6 días a la semana*)
- ○ Every day (*Todos los días*)

How often do you eat together with your children at least one meal a day?

¿Con qué frecuencia come usted junto con sus niños por lo menos una comida al día?

- ○ Less than 1 day each week (*Menos de 1 día a la semana*)
- ○ 1-2 days a week (*1-2 días a la semana*)
- ○ 3-4 days a week (*3-4 días a la semana*)
- ○ 5-6 days a week (*5-6 días a la semana*)
- ○ Every day (*Todos los días*)

CYFAR Parent/Caregiver Pre-Survey

In a typical month, how often are high-fat or high-sugar snacks available at home for your children to eat? This includes chips, candy, cookies, and sweets.

En un mes típico, ¿con qué frecuencia tiene alimentos altos en grasa y altos en azúcar disponibles para que sus niños los coman? Esto incluye (chips) papas fritas, caramelos, galletas, y dulces.

- ○ Almost never (*Casi nunca*)
- ○ Less than half the time (*Menos de la mitad del tiempo*)
- ○ Half the time (*Medio tiempo*)
- ○ More than half the time (*Más de la mitad del tiempo*)
- ○ Almost always (*Casi siempre*)

In a typical month, how often are fruits available at home for your children to eat?

En un mes típico, ¿con qué frecuencia hay frutas disponibles en su casa para que sus niños puedan comer?

- ○ Almost never (*Casi nunca*)
- ○ Less than half the time (*Menos de la mitad del tiempo*)
- ○ Half the time (*Medio tiempo*)
- ○ More than half the time (*Más de la mitad del tiempo*)
- ○ Almost always (*Casi siempre*)

CYFAR Parent/Caregiver Pre-Survey

Does your 3rd grader have a TV in his or her bedroom?

¿El niño de tercer grado tiene un televisor en su habitación?

- ○ Yes (*Sí*)
- ○ No (*No*)

How many days per week does your family sit at a table to eat dinner together? [This includes eating with some or all of the family and when it is just your child and yourself. This does not include eating dinner together in front of the television – or in any other place other than at a dinner table.]

¿Cuántos días a la semana su familia se sienta a la mesa para comer la cena juntos? [Esto incluye comer con algunos o todos los integrantes de la familia y cuando son solo su hijo y usted. Esto no incluye comer todos juntos frente a la televisión o en cualquier otro lugar que no sea la mesa del comedor].

- ○ 0 days per week (*0 días a la semana*)
- ○ 1 day per week (*1 día a la semana*)
- ○ 2 days per week (*2 días a la semana*)
- ○ 3 days per week (*3 días a la semana*)
- ○ 4 days per week (*4 días a la semana*)
- ○ 5 days per week (*5 días a la semana*)
- ○ 6 days per week (*6 días a la semana*)
- ○ 7 days per week (*7 días a la semana*)

CYFAR Parent/Caregiver Pre-Survey

Please rate how often you do this:

Califique con qué frecuencia usted hace esto:

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
Do you encourage this child to eat healthy foods before unhealthy ones? (*¿Usted anima a su hijo a comer alimentos saludables antes que los menos saludables?*)	○	○	○	○	○

Please rate how much you agree or do not agree with each statement as it relates to you and your family.

Califique qué tan de acuerdo o en desacuerdo está con cada una de las afirmaciones con respecto a su familia.

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
I encourage my child to try new foods. (*Animo a mi hijo a que pruebe alimentos nuevos.*)	○	○	○	○	○

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
I tell my child that healthy food tastes good. (*Le digo a mi hijo que los alimentos saludables saben bien.*)	○	○	○	○	○

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
I encourage my child to eat a variety of foods. (*Animo a mi hijo a que coma alimentos variados.*)	○	○	○	○	○

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
I involve my child in planning family meals. (*Dejo que mi hijo participe al planear las comidas familiares.*)	○	○	○	○	○

CYFAR Parent/Caregiver Pre-Survey

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
I allow my child to help prepare family meals. (*Le permito a mi hijo que ayude a preparar las comidas familiares.*)	○	○	○	○	○

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
I encourage my child to participate in grocery shopping. (*Animo a mi hijo a que participe en las compras de comestibles.*)	○	○	○	○	○

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
I model healthy eating for my child by eating healthy foods myself. (*Le doy a mi hijo el ejemplo de una alimentación saludable comiendo alimentos saludables.*)	○	○	○	○	○

CYFAR Parent/Caregiver Pre-Survey

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
I try to eat healthy foods in front of my child, even if they are not my favorite. (*Trato de comer alimentos saludables frente a mi hijo, aunque no sean mis favoritos.*)	○	○	○	○	○

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
I try to show enthusiasm about eating healthy foods. (*Trato de mostrar entusiasmo por comer alimentos saludables.*)	○	○	○	○	○

	Never (*Nunca*)	Rarely (*Raramente*)	Sometimes (*De vez en cuando*)	Often (*Frecuentemente*)	Always (*Siempre*)
I show my child how much I enjoy eating healthy foods. (*Le muestro a mi hijo cuánto disfruto comiendo alimentos saludables.*)	○	○	○	○	○

CYFAR Parent/Caregiver Pre-Survey

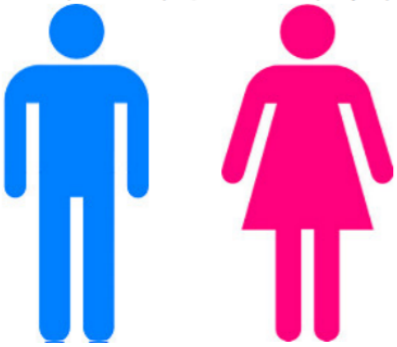
Please answer the following questions about you.

Por favor, conteste las siguientes preguntas sobre usted.

Are you a male or a female?

¿Es usted hombre o mujer?

○ Male (*Hombre*) ○ Female (*Mujer*)



How old are you?

¿Cuántos años tiene usted?

What is your ethnicity?

¿Cuál es su etnicidad?

○ Hispanic or Latino (*Hispano o Latino*)

○ Non-Hispanic or Non-Latino (*Ni Hispano o Ni Latino*)

CYFAR Parent/Caregiver Pre-Survey

**What is your race? (choose one or more) <br?
*¿Cuál es su raza? (Elija uno o varios)***

- [ ] American Indian/Alaskan Native (*Indio o native de Alaska*)
- [ ] Asian (*Asiático*)
- [ ] Black or African American (*Afro-Americano*)
- [ ] Native Hawaiian/ Pacific Islander (*Nativo de Hawaii o las Islas Pacificas*)
- [ ] White (*Caucásico*)
- [ ] Other (*Otro*)

What is your current level of employment?

¿Cuál es su nivel actual de empleo?

- ○ Employed Full-time (*Empleado Tiempo Completo*)
- ○ Employed Part-time (*Empleado Tiempo Partial*)
- ○ Unemployed (*Desempleado*)
- ○ Unemployed, stay at home parent (*Desempleado, padre en casa*)
- ○ Unemployed, Student (*Desempleado, Estudiante*)
- ○ Retired (*Retirado*)

What is your highest level of education completed?

¿Cuál es el nivel de educación más alto que usted ha completado?

- ○ Less than high school (*Menos de secundaria*)
- ○ High school graduate or GED (*Escuela Secundaria o GED*)
- ○ Post-secondary technical training (*Formación técnica post-secundaria*)
- ○ Some college (*Algún estudio universitario*)
- ○ Associate's degree (*Grado de Asociado*)
- ○ Bachelor's degree (*Grado de Licenciatura*)
- ○ Graduate degree (*Postgrado*)

CYFAR Parent/Caregiver Pre-Survey

Have you ever served in the military including the Guard or Reserve?

¿Ha usted servido en el servicio militar, incluso la guardia o la reserva?

- ○ Yes (*Sí*)
- ○ No (*No*)

If yes, please specify:

Si respondió "sí", por favor especifique:

- ○ Air Force (*Fuerzas Aéreas*)
- ○ Army (*Ejército*)
- ○ Guard (*Guardia Nacional*)
- ○ Marine Corps (*cuerpo de Marines*)
- ○ Navy (*marina de guerra*)
- ○ Reserve (*reserva Nacional*)

Are you currently active?

¿Está usted actualmente en el servicio?

- ○ Yes (*Sí*)
- ○ No (*No*)

CYFAR Parent/Caregiver Pre-Survey

How long have you participated in 4-H?
(¿Por cuánto tiempo usted ha participado en 4-H?)

- ○ Less than 1 year (Menos de 1 año)
- ○ 1 year (1 año)
- ○ 2-3 years (2-3 años)
- ○ 4-5 years (4-5 años)
- ○ 6-7 years (6-7 años)
- ○ 8-9 years (8-9 años)
- ○ 10 or more years (10 años o más)
- ○ Does not apply to me (Esto no me aplica)

Are you involved in any other community/volunteer activities?
(¿Usted participa en cualquier otra actividad comunitaria o voluntaria?)

- ○ Yes (Sí)
- ○ No (No)

How many other activities are you involved in?
(¿En cuántas otras actividades participa usted?)

CYFAR Parent/Caregiver Pre-Survey

Read each statement and then select the response which best shows how you feel.

Lea cada frase y luego seleccione la respuesta que mejor demeustra lo que sientes.

	Strongly do not agree (*Totalmente no de acuerdo*)	Do not agree (*No de acuerdo*)	Agree (*De acuerdo*)	Strongly agree (*Totalmente de acuerdo*)
I feel comfortable working with a computer/iPad. (*Me siento cómodo trabajando con una computadora/iPad*)	○	○	○	○

	Strongly do not agree (*Totalmente no de acuerdo*)	Do not agree (*No de acuerdo*)	Agree (*De acuerdo*)	Strongly agree (*Totalmente de acuerdo*)
I get a sinking feeling when I think of trying to use a computer/iPad. (*Me da una sensación de*	○	○	○	○

	Strongly do not agree (*Totalamente no de acuerdo*)	Do not agree (*No de acuerdo*)	Agree (*De acuerdo*)	Strongly agree (*Totalamente de acuerdo*)
I think that it takes a long time to finish when I use a computer/iPad. (*Creo que se tarda mucho tiempo en terminar cuando yo uso un computador/iPad*)	○	○	○	○

CYFAR Parent/Caregiver Pre-Survey

Read each statement and then select the response which best shows how you feel.

	Strongly do not agree (*Totalamente no de acuerdo*)	Do not agree (*No de acuerdo*)	Agree (*De acuerdo*)	Strongly agree (*Totalamente de acuerdo*)
Computers/iPads do not scare me at all. (*El computador/iPad no me asustan en absoluto*)	○	○	○	○

	Strongly do not agree (*Totalamente no de acuerdo*)	Do not agree (*No de acuerdo*)	Agree (*De acuerdo*)	Strongly agree (*Totalamente de acuerdo*)
Working with a computer/iPad makes me nervous. (*Trabajar con un computador/iPad me pone nervioso*)	○	○	○	○

	Strongly do not agree (*Totalamente no de acuerdo*)	Do not agree (*No de acuerdo*)	Agree (*De acuerdo*)	Strongly agree (*Totalamente de acuerdo*)
Using a computer/iPad is very frustrating. (*Usar un computador/iPad es muy frustrante.*	○	○	○	○

CYFAR Parent/Caregiver Pre-Survey

	Strongly do not agree (*Totalamente no de acuerdo*)	Do not agree (*No de acuerdo*)	Agree (*De acuerdo*)	Strongly agree (*Totalamente de acuerdo*)
I will do as little work with computers/iPads as possible. (*Yo haré lo mas minimo possible en un computador/iPad*)	○	○	○	○

	Strongly do not agree (*Totalamente no de acuerdo*)	Do not agree (*No de acuerdo*)	Agree (*De acuerdo*)	Strongly agree (*Totalamente de acuerdo*)
Computers/iPads are difficult to use. (*El computador/iPad son dificiles de usar.*)	○	○	○	○

You're finished! Thank you for completing our survey!

Haz terminado! Gracias por completar nuestra encuesta!

Additional Parent/Caregiver Post-Assessment (only) Survey Questions

CYFAR Parent/Caregiver Post-Survey

Please answer the following questions about you and your family.

Por favor, conteste las siguientes preguntas sobre usted y su familia.

How many children under the age of 18 live in your household?

¿Cuántos niños menores de 18 años viven en su casa?

- ○ 1
- ○ 2
- ○ 3
- ○ 4 or more (4 o más)

Are you currently living with a spouse or partner?

¿Vive usted actualmente con su esposo/a o pareja?

- ○ Yes (*Sí*)
- ○ No (*No*)

CYFAR Parent/Caregiver Post-Survey

**On most nights, who prepares the evening meal or dinner? <br?
*¿Quién prepara la cena o comida de la tarde la mayoría de las noches?***

- [ ] Myself (*Yo*)
- [ ] My partner or spouse (*Mi pareja o esposo/a*)
- [ ] Another adult (child's grandparent, aunt, uncle, cousin, babysitter) (*Otro adulto (abuelo/abuela, tío/tía, primo/prima, o niñera de mi niño)*)
- [ ] A child of mine (*Otro de mis niños*)
- [ ] We do not eat an evening meal (*No cenamos*)

Who usually does most of your family's food shopping?

¿Quién normalmente va de compras para su familia?

- ( ) Myself (*Yo*)
- ( ) My partner or spouse (*Mi pareja o esposo/a*)
- ( ) Another adult (child's grandparent, aunt, uncle, cousin, babysitter) (*Otro adulto (abuelo/abuela, tío/tía, primo/prima, o niñera de mi niño)*)
- ( ) A child of mine (*Otro de mis niños*)

Appendix K:
After School Student Baseline and Post-Assessment Survey Questions for both Treatment and Control Groups

CYFAR Afterschool Kids Pre-survey

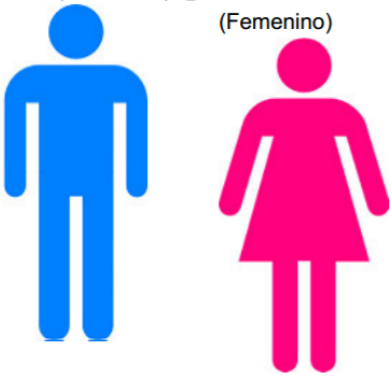
How old are you?
(¿Cuántos años tienes?)

○ 7 ○ 8 ○ 9 ○ 10 ○ 11

CYFAR Afterschool Kids Pre-survey

Are you male or female?
(¿Eres de sexo masculino o femenino?)

○ Male (Masculino) ○ Female (Femenino)



CYFAR Afterschool Kids Pre-survey

What grade are you in school?

- 1st grade (1.er grado)
- 2nd grade (2.º grado)
- 3rd grade (3.er grado)
- 4th grade (4.º grado)
- 5th grade (5.º grado)
- 6th grade (6.º grado)
- 7th grade (7.º grado)
- 8th grade (8.º grado)

What school do you go to during the day?
(¿A qué escuela vas durante el día?)

- Other (Otra)
- Sackett School (Escuela primaria Sackett School)
- Bailey Elementary
- Lima Elementary

Do you speak Spanish at home?
(¿Hablas español en tu casa?)

- Yes (Sí)
- No (No)
- Sometimes (A veces)

CYFAR Afterschool Kids Pre-survey

Are you...
(¿Eres...)

- [ ] American Indian or Alaska Native (indio americano o nativo de Alaska?)
- [ ] Asian (asiático?)
- [ ] Black or African American (negro o afroamericano?)
- [ ] Native Hawaiian or Pacific Islander (nativo de Hawái o de otras islas del Pacífico?)
- [ ] White (blanco?)
- [ ] Other (otro?)
- [ ] Not Sure (No estoy seguro)

Are either of your parents in the military (for example, the Air Force, Army, Guard, Marine Corps, Navy or Reserve)?
(¿Alguno de tus padres está en las fuerzas armadas (por ejemplo, en la Fuerza Aérea, en el Ejército, en la Guardia Nacional, en la Infantería de Marina, en la Marina o en la Reserva)?)

- ( ) Yes (Sí)
- ( ) No (No)
- ( ) I don't know (No sé)

Which of these do they work for?
¿En cuál de estas fuerzas armadas trabajan?)

- ( ) Air Force (Fuerza Aérea)
- ( ) Army (Ejército)
- ( ) Guard (Guardia Nacional)
- ( ) Marine Corps (Infantería de Marina)
- ( ) Navy (Marina)
- ( ) Reserve (Reserva)
- ( ) I don't know (No sé)

CYFAR Afterschool Kids Pre-survey

Do you make food with your family?
(¿Preparas alimentos con tu familia?)

- ○ Yes (Sí)
- ○ No (No)

Do you make food with your friends?
(¿Preparas alimentos con tus amigos?)

- ○ Yes (Sí)
- ○ No (No)

Do you cook?
(¿Cocinas?)

- ○ Yes (Sí)
- ○ No (No)

CYFAR Afterschool Kids Pre-survey

	I really like it (Me gusta mucho)	I like it (Me gusta)	I don't like it (No me gusta)	I really don't like it (Realmente no me gusta)	I don't know if I like it (No sé si me gusta)
 Grapes (Uvas)	○	○	○	○	○
 Romaine Lettuce (Lechuga romana)	○	○	○	○	○
 Cantaloupe (Melón cantalupo)	○	○	○	○	○
 Celery (Apio)	○	○	○	○	○

CYFAR Afterschool Kids Pre-survey

	I really like it (Me gusta mucho)	I like it (Me gusta)	I don't like it (No me gusta)	I really don't like it (Realmente no me gusta)	I don't know if I like it (No sé si me gusta)
 Red Onions (Cebollas rojas)	○	○	○	○	○
 Black Beans (Frijoles negro)	○	○	○	○	○
 Tomato(Tomate)	○	○	○	○	○
 Plum (Ciruela)	○	○	○	○	○

CYFAR Afterschool Kids Pre-survey

	I really like it (Me gusta mucho)	I like it (Me gusta)	I don't like it (No me gusta)	I really don't like it (Realmente no me gusta)	I don't know if I like it (No sé si me gusta)
 Squash (Calabaza)	○	○	○	○	○
 Spinach (Espinaca)	○	○	○	○	○
 Mango	○	○	○	○	○
 Cucumber (Pepino)	○	○	○	○	○
 Broccoli (Brócoli)	○	○	○	○	○

CYFAR Afterschool Kids Pre-survey

	I really like it (Me gusta mucho)	I like it (Me gusta)	I don't like it (No me gusta)	I really don't like it (Realmente no me gusta)	I don't know if I like it (No sé si me gusta)
 Tangerines (Mandarinas)	○	○	○	○	○
 Peas (Guisantes)	○	○	○	○	○
 Strawberries (Fresas)	○	○	○	○	○
 Grapefruit (Toronja)	○	○	○	○	○

CYFAR Afterschool Kids Pre-survey

I can make a snack with fruit.
(Puedo hacer un refrigerio con frutas.)

YES! (¡SÍ!) Yes (Sí) No (No) NO! (¡NO!) Not sure (No estoy seguro)

I can make a snack with vegetables.
(Puedo hacer un refrigerio con vegetales.)

YES! (¡SÍ!) Yes (Sí) No (No) NO! (¡NO!) Not sure (No estoy seguro)

With help, I can use a recipe.
(Con ayuda, puedo utilizar una receta.)

YES! (¡SÍ!) Yes (Sí) No (No) NO! (¡NO!) Not sure (No estoy seguro)

I can help my family make a meal.
(Puedo ayudar a mi familia a preparar una comida.)

YES! (¡SÍ!) Yes (Sí) No (No) NO! (¡NO!) Not sure (No estoy seguro)

CYFAR Afterschool Kids Pre-survey

I can make a salad.
(Puedo hacer una ensalada.)

○ YES! (¡SÍ!) ○ Yes (Sí) ○ No (No) ○ NO! (¡NO!) ○ Not sure (No estoy seguro)

I can cut up food.
(Puedo cortar alimentos.)

○ YES! (¡SÍ!) ○ Yes (Sí) ○ No (No) ○ NO! (¡NO!) ○ Not sure (No estoy seguro)

I can measure ingredients.
(Puedo medir ingredientes.)

○ YES! (¡SÍ!) ○ Yes (Sí) ○ No (No) ○ NO! (¡NO!) ○ Not sure (No estoy seguro)

I can follow recipe directions.
(Puedo seguir las instrucciones de una receta.)

○ YES! (¡SÍ!) ○ Yes (Sí) ○ No (No) ○ NO! (¡NO!) ○ Not sure (No estoy seguro)

CYFAR Afterschool Kids Pre-survey

How do you feel about cooking?
(¿Qué piensas cuando cocinas?)

- **I really like** to cook. (**Realmente me gusta** cocinar.)
- **I kind of like**to cook. (**Me gusta un poco** cocinar.)
- **I don't like** to cook. (**No me gusta** cocinar.)
- **I really don't like** to cook. (**Realmente no me gusta** cocinar.)
- **I'm not sure** if I like to cook. (**No estoy seguro** de si me gusta cocinar.)

How do you feel about foods that you have helped cook?
(¿Qué piensas de los alimentos que ayudaste a cocinar?)

- **I really like** foods that I have helped cook. (**Realmente me gustan** los alimentos que ayudé a cocinar.)
- **I kind of like** foods that I have helped cook. (**Me gustan un poco** los alimentos que ayudé a cocinar.)
- **I don't like** foods that I have helped cook. (**No me gustan** los alimentos que ayudé a cocinar.)
- **I really don't like** foods that I have helped cook. (**Realmente no me gustan** los alimentos que ayudé a cocinar.)
- **I'm not sure** if I have liked foods that I have helped cook. (**No estoy seguro** de si me gustan los alimentos que ayudé a cocinar.)

How do you feel about measuring ingredients?
(¿Qué piensas acerca de medir los ingredientes?)

- **I really like** to measure ingredients. (**Realmente me gusta** medir los ingredientes.)
- **I kind of like** to measure ingredients. (**Me gusta un poco** medir los ingredientes.)
- **I don't like** to measure ingredients. (**No me gusta** medir los ingredientes.)
- **I really don't like** to measure ingredients. (**Realmente no me gusta** medir los ingredientes.)
- **I'm not sure** if I like to measure ingredients. (**No estoy seguro** de si me gusta medir los ingredientes.)

How do you feel about making snacks?
(¿Qué piensas sobre preparar refrigerios?)

- **I really like** to make snacks. (**Realmente me gusta** preparar refrigerios.)
- **I kind of like** to make snacks. (**Me gusta un poco** preparar refrigerios.)
- **I don't like** to make snacks. (**No me gusta** preparar refrigerios.)
- **I really don't like** to make snacks. (**Realmente no me gusta** preparar refrigerios.)
- **I'm not sure** if I like to make snacks. (**No estoy seguro** de si me gusta preparar refrigerios.)

How do you feel about making food with your friends?
(¿Qué piensas sobre preparar alimentos con tus amigos?)

- **I really like** to make food with my friends. (**Realmente me gusta** preparar alimentos con mis amigos.)
- **I kind of like** to make food with my friends. (**Me gusta un poco** preparar alimentos con mis amigos.)
- **I don't like** to make food with my friends. (**No me gusta** preparar alimentos con mis amigos.)
- **I really don't like** to make food with my friends. (**Realmente no me gusta** preparar alimentos con mis amigos.)
- **I'm not sure** if I like to make food with my friends. (**No estoy seguro** de si me gusta preparar alimentos con mis amigos.)

How do you feel about making food with your family?
(¿Qué piensas sobre preparar alimentos con tu familia?)

- **I really like** to make food with my family. (**Realmente me gusta** preparar alimentos con mi familia.)
- **I kind of like** to make food with my family. (**Me gusta un poco** preparar alimentos con mi familia.)
- **I don't like** to make food with my family. (**No me gusta** preparar alimentos con mi familia.)
- **I really don't like** to make food with my family. (**Realmente no me gusta** preparar alimentos con mi familia.)
- **I'm not sure** if I like to make food with my family. (**No estoy seguro** de si me gusta preparar alimentos con mi familia.)

CYFAR Afterschool Kids Pre-survey

These are some examples of sweet snacks: (Estos son algunos ejemplos de refrigerios dulces:)






How many times did you eat a sweet snack yesterdaybetween your meals? (¿Cuántas veces comiste ayer un refrigerio dulce entre las comidas?)

- ○ 0 times (0 veces)
- ○ 1 time (1 vez)
- ○ 2 times (2 veces)
- ○ 3 times (3 veces)
- ○ 4 times (4 veces)
- ○ 5 or more times (5 veces o más)

CYFAR Afterschool Kids Pre-survey

These are some examples of salty snacks: (Estos son algunos ejemplos de refrigerios salados:)

How many times did you eat a salty snack yesterday between your meals? (¿Cuántas veces comiste ayer un refrigerio salado entre las comidas?)

- 0 times (0 veces)
- 1 time (1 vez)
- 2 times (2 veces)
- 3 times (3 veces)
- 4 times (4 veces)
- 5 or more times (5 veces o más)

CYFAR Afterschool Kids Pre-survey

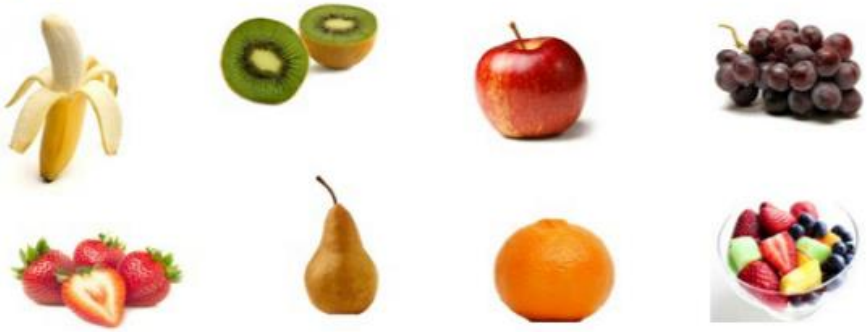
These are some examples of sugary drinks: (Estos sonalgunos ejemplos de bebidas azucaradas:)

How many times did you drink a sugary drink yesterday?
For this question, do NOT include 100% fruit juice, chocolate milk, or diet drinks. (¿Cuántas veces bebiste una bebida azucarada ayer?
Para responder a esta pregunta, NO incluyas el jugo de frutas 100 % natural, la leche chocolatada ni las bebidas dietéticas.)

- 0 times (0 veces)
- 1 time (1 vez)
- 2 times (2 veces)
- 3 times (3 veces)
- 4 times (4 veces)
- 5 or more times (5 veces o más)

CYFAR Afterschool Kids Pre-survey

Each of these is an example of eating fruit 1 time: (Cada uno de estos es un ejemplo de comer fruta 1 vez:)



How many times did you eat fruit yesterday? For this question, doNOT include fruit juice. (¿Cuántas veces comiste fruta ayer? Para responder a esta pregunta, NO incluyas el jugo de fruta.)

- 0 times (0 veces)
- 1 time (1 vez)
- 2 times (2 veces)
- 3 times (3 veces)
- 4 times (4 veces)
- 5 or more times (5 veces o más)

CYFAR Afterschool Kids Pre-survey

Each of these is an example of eating vegetables 1 time: (Cada uno de estos es un ejemplo de comer vegetales 1 vez:)

How many times did you eat vegetables yesterday? DoNOT include french fries. (¿Cuántas veces comiste vegetales ayer? NO incluyas las papas fritas.)

- 0 times (0 veces)
- 1 time (1 vez)
- 2 times (2 veces)
- 3 times (3 veces)
- 4 times (4 veces)
- 5 or more times (5 veces o más)

CYFAR Afterschool Kids Pre-survey

How many other children live in your home?
(¿Cuántos otros niños viven en tu casa?)

- ○ None (ninguno)
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ More than 4 (Más de 4)

On most nights, who makes dinner for you?
(¿Quién prepara la cena para ti la mayoría de las noches?)

- ○ My mom (Mi madre)
- ○ My dad (Mi padre)
- ○ Myself (Yo mismo)
- ○ My brother or sister (Mi hermano o hermana)
- ○ Another adult that is not my mom or dad (grandparent, aunt, uncle, babysitter) (Otro adulto que no es mi madre o padre (abuelo, abuela, tío, tía, niñera))
- ○ I do not eat dinner (Yo no como la cena)

CYFAR Afterschool Kids Pre-survey

How long have you participated in 4-H?
(¿Cuánto tiempo participaste en el programa 4H?)

- Less than 1 year (Menos de 1 año)
- 1 year (1 año)
- 2-3 years (2 a 3 años)
- 4-5 years (4 a 5 años)
- 6-7 years (6 a 7 años)
- 8-9 years (8 a 9 años)
- 10 or more years (10 o más años)
- Does not apply to me (No es aplicable para mí)

How long have you participated in any in-school activities like sports, student government, drama or dance, academic clubs, pep clubs, band or symphony?
(¿Cuánto tiempo participaste en actividades escolares como deportes, gobierno estudiantil, teatro, danzas, clubes académicos, "pep clubs", bandas u orquestas sinfónicas?)

- Less than 1 year (Menos de 1 año)
- 1 year (1 año)
- 2-3 years (2 a 3 años)
- 4-5 years (4 a 5 años)
- 6-7 years (6 a 7 años)
- 8-9 years (8 a 9 años)
- 10 or more years (10 o más años)
- Does not apply to me (No es aplicable para mí)

How long have you participated in any other out-of-school activities like Boy Scouts, Girl Scouts, YMCA, Girls Inc., Junior Achievement, or youth groups at church, synagogue, or mosques?
(¿Cuánto tiempo has participado en actividades fuera de la escuela, por ejemplo, en actividades de organizaciones como las de "Boy Scouts" (niños exploradores), "Girl Scouts" (niñas exploradoras), "YMCA" (Asociación de Jóvenes Cristianos), "Girls Inc.", "Junior Achievement" o en los grupos juveniles de las iglesias, sinagogas o mezquitas?)

- Less than 1 year (Menos de 1 año)
- 1 year (1 año)
- 2-3 years (2 a 3 años)
- 4-5 years (4 a 5 años)
- 6-7 years (6 a 7 años)
- 8-9 years (8 a 9 años)
- 10 or more years (10 o más años)
- Does not apply to me (No es aplicable para mí)

CYFAR Afterschool Kids Pre-survey

Directions: Choose the answer which best shows how you feel.
(Instrucciones: elige la respuesta que mejor representa lo que piensas.)

	No (No)	Sometimes (A veces)	Yes (Sí)	I don't know (No sé)
I enjoy doing things on a computer/iPad. (Me gusta hacer cosas en la computadora o el iPad.)	○	○	○	○
I am tired of using a computer/iPad. (Estoy cansado de usar la computadora o el iPad.)	○	○	○	○
When you use a computer or iPad, are you able to pay attention? (Cuando usas una computadora o un iPad, ¿puedes prestar atención?)	○	○	○	○
I enjoy computer/iPad games very much. (Me gustan mucho los juegos de la computadora o del iPad.)	○	○	○	○
I would work harder if I could use computers/iPads more often. (Podría trabajar más si pudiera usar una computadora o un iPad más a menudo.)	○	○	○	○
I know that computers/iPads give me the chance to learn many new things. (Sé que las computadoras y los iPad me dan la oportunidad de aprender muchas cosas nuevas.)	○	○	○	○
I can learn many things when I use a computer/iPad. (Cuando uso una computadora o un iPad, puedo aprender muchas cosas.)	○	○	○	○
I enjoy lessons on the computer/iPad. (Me gusta estudiar las lecciones en la computadora o en el iPad.)	○	○	○	○
I think that it is very important for me to learn how to use a computer/iPad. (Creo que aprender a usar una computadora o un iPad es muy importante para mí.)	○	○	○	○

Additional After School Student Post-Assessment (only) Survey Questions

CYFAR Afterschool Kids Post-survey

Who usually does most of your family's food shopping? ¿Quién normalmente va de compras para su familia?

- ○ Myself (*Yo*)
- ○ My mom or dad (*Mi madre or padre*)
- ○ Another adult that is not my mom or dad (grandparent, aunt, uncle, babysitter) (*Otro adulto que no es mi madre or padre (abuelo/abuela, tio/tía, niñera)*)
- ○ My sister or brother (*Mi hermano o hermana*)

Appendix L:
In School Curriculum

Weekly program includes:

- Attendance
- Recital of the *Body Quest Warrior vow* while doing standing physical activity
- Review of the previous week's topic
- Questions and time for sharing about consumption at home and trying new foods
- Main lesson (see below)- hands-on learning
- Wrap up
- Handouts to share with the family and prompt family discussion.
- *iPads are used biweekly and feature the BQ Warriors on different adventures and allow the students to participate in various interactive games to reinforce topics previously taught.

Main lesson:
WEEK 1: Introductory Lesson

- iPad: Pre-Survey
- Character Introduction with posters and BQ playing cards
- Food Groups

WEEK 2: Lesson 1 Brave Heart

- Trying new fruits and vegetables
- iPad: Introductory app
- Go, Slow, Whoa of Food Groups

WEEK 3: Lesson 1 Reinforcement

- Portion sizes of fruits and vegetables
- iPad: Lesson 1 Body Doc

WEEK 4: Lesson 2 Naming the Battle Groups

- Eating foods from all food groups
- Fruit and Vegetables Variety

WEEK 5: Lesson 2 Reinforcement

- iPad: Lesson 2 Muscle Max
- MyPlate

WEEK 6: Lesson 3 Balanced Meals

- Balanced meals
- Adding fruits and vegetables into meals and snacks

WEEK 7: Lesson 3 Reinforcement

- iPad: Lesson 3 Grano Supa
- Breakfast

WEEK 8: Lesson 4 What Each Food Group Offers
- Function of each food group
- Fast Food

WEEK 9: Lesson 4 Reinforcement
- iPad: Lesson 4 Shining Rainbow
- Fruits and Vegetables: function of each color

WEEK 10: Lesson 5 Battle Snacks
- Snacks

WEEK 11: Lesson 5 Reinforcement
- iPad: Lesson 5 Fiberlicious
- Fiber

WEEK 12: Lesson 6 Influencing Others to Consume F&V
- How to convince others of the value of F&V
- Think Your Drink

WEEK 13: Lesson 6 Reinforcement
- iPad 6: Super Slurper
- IPad: Post Survey
- Wrap up

Appendix M:
Parent/Caregiver Curriculum

Weekly program includes:

- Attendance
- Review of previous week's topic and recipe made
- Main lesson (see below)- hands on learning
- iPad use
- Handout on nutrition lesson to take home
- Recipe to take home
- Goal setting
- Wrap up

Main lesson:
WEEK 1: Introduction and Think Your Drink

- iPad: Pre-Survey
- Drink low fat milk or water instead of sweetened drinks
- Introduce paths, creating change steps and encourage small changes

WEEK 2: Fruits and Vegetables

- iPad: explore USDA MyPlate website; use Doodle application to draw different colored FV
- Eat more fruits and vegetables
- Introduce keys

WEEK 3: Fast Food

- iPad: fast food restaurant nutrition information online
- Eat fewer high-fat and high-sugar foods
- Firm and responsive, shaping, leading by example, can-do

WEEK 4: Serving size and family meals

- iPad: myfitpal application
- Have sensible serving sizes, importance of family meals, importance of menu planning
- Firm and responsive continued, division of responsibility with eating

WEEK 5: Screen time and Physical Activity

- iPad: kidsinfo.com website
- Food and link to media, unhealthy snacking linked to increased screen time
- Increase Physical activity, Division of Responsibility with physical activity, decrease screen time, time management

WEEK 6: Review and Celebrate

- iPad: post-surveys
- Wrap up and review
- Progress and plans to continue healthy paths

Appendix N:
After School Student Curriculum

Weekly program includes:

- Attendance
- Review of previous week's topic and recipe made
- Main lesson (see below)- hands on learning
- Preparing, cooking, and tasting recipe of the week (see below)
- iPad use
- Handout on nutrition lesson to take home
- Recipe to take home
- Wrap up

Main lesson:
WEEK 1: Exploring Healthy Foods

- iPad: Pre-Survey, Doodle application to draw "Go foods"
- Food groups and Go, Slow, and Whoa
- Skillet Lasagna

WEEK 2: MyPlate

- iPad: Doodle application to draw MyPlate
- MyPlate
- Easy Cheesy Chicken and Broccoli

WEEK 3: Fruit and Vegetable Variety

- iPad: iBook application to start creating recipe book
- Function of different colored FV
- Black bean burger with Salad

WEEK 4: Breakfast

- iPad: Educreation to create mini-lessons on importance of breakfast
- Breakfast
- Whole Wheat Blueberry Pancakes and Frittata Verde

WEEK 5: Recommended amount of Fruits and Vegetables and Vitamin C

- iPad: iBook to start creating recipe book
- Amounts of FV
- Sweet Potato Quesadilla

WEEK 6: Adding vegetables into every meal

- iPad: post-survey
- Adding vegetables into meals
- Sloppy Joes